MARCH 26, 1956

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

Brazing

Production uses boom as industry takes new look at this veteran
—page 126

✔ Big Expansion Plans Mean Upturn
—page 85

✔ Auto Capacity: Up 1 Million Cars
—page 99

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OUR 54th YEAR OF DESIGNING AND MANUFACTURING SEAMLESS TUBE MILLS & AUXILIARY EQUIPMENT

HOW TO MAKE BETTER SEAMLESS...

● The search for better ways of making seamless never ceases... just as it never ceases for merchant pipe, cold rolled, galvanized, bar stock or any other product.

The formula remains the same. You concentrate on improving operating techniques. We concentrate on improving equipment. Many of the ideas for equipment originate with you and reach maturity through joint effort with us. Many new ideas originate with us and are developed with you.

How about this year? At this moment, many of Aetna's engineering hours are being expended on new ideas in seamless equipment. You will be hearing about them . . . or perhaps you already have.

AETNA • STANDARD

THE AETNA-STANDARD ENGINEERING COMPANY

GENERAL OFFICES: PITTSBURGH, PA. **PLANTS: ELLWOOD CITY, PA., WARREN, OHIO**

CONTINUOUS GALVANIZING LINES • CONTINUOUS ELECTROLYTIC TINNING LINES • SIDE TRIMMING AND SHEAR LINES AND OTHER FINISHING EQUIPMENT • CONTINUOUS BUTT WELD PIPE MILLS • SEAMLESS TUBE MILLS • DRAWBENCHES AND OTHER COLD DRAW EQUIPMENT • ROLLS AND CASTINGS • EXTRUDERS, MILLS, PRESSES FOR RUBBER AND PLASTIC

Rowe Manufacturing Co., Whippany, N. J., use Bethlehem sheets to produce a wide variety of merchandise-dispensing machines.

"You pays your money and you takes your choice"

We Americans seemingly love to slip a coin into a slot. And the makers of coin-operated vending machines are doing a bang-up job of catering to this predilection. Today you can put your money in the slot and have your choice of anything from soft drinks and cigarettes to coffee, cakes and cleansing tissues.

The vending machine business got a sharp boost right after World War II and now it's really booming. Obviously sheet steel plays a big part in the manufacture of these units, and Bethlehem supplies a large share of sheets to makers of machines like those shown here.

The vending machine is but one of many sheet-steel applications that have claimed a larger and larger tonnage of Bethlehem sheets in recent years. Television cabinets, room air-conditioners, galvanized steel products, agricultural machinery — these and many other items have zoomed in popularity just of late.

Meanwhile the needs of longer-established sheet steel users continue right along. Which simply adds up to an unprecedented demand on Bethlehem's hot- and cold-rolled sheet facilities. We are trying earnestly to satisfy this demand.

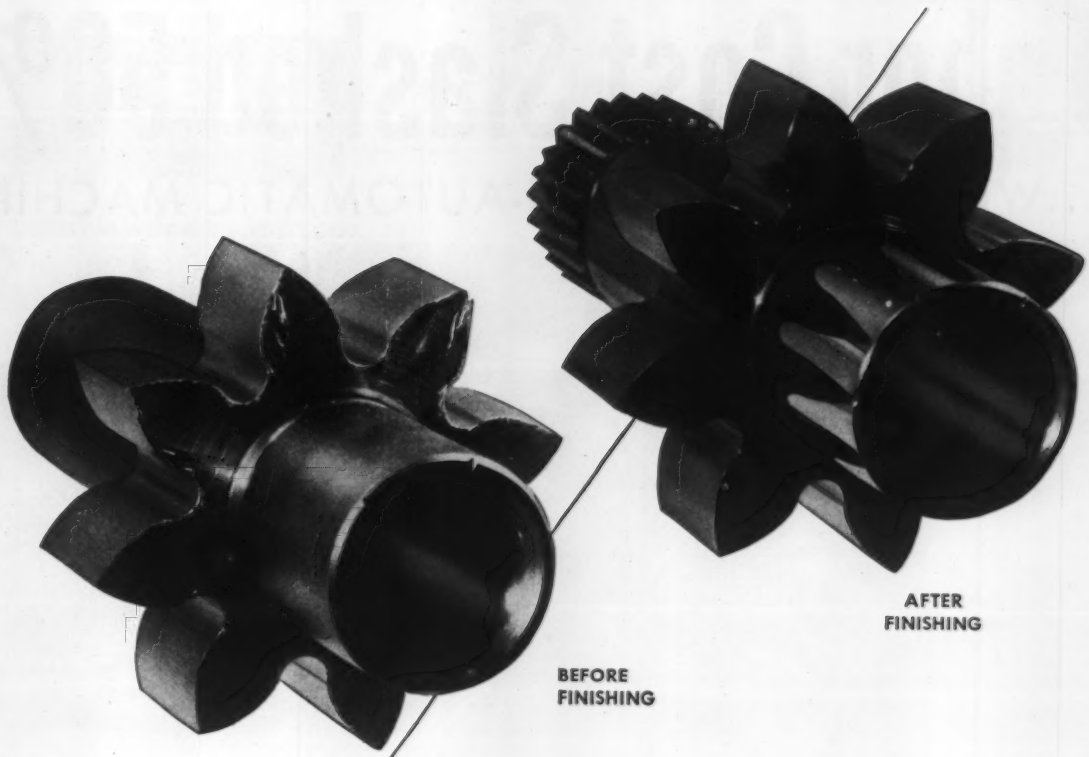
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM SHEETS

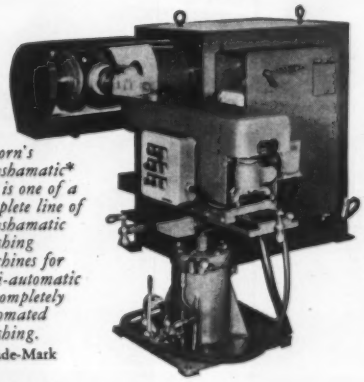
BETHLEHEM STEEL

exit...
ONE SITTING DUCK
A message of importance to all contestants in the battle against high production costs
PIT A World War II plane against a modern jet fighter and what have you got? One sitting duck! Why? Not because the "prop job" got any *slower*. But because the modern supersonic jet got so much *faster!*
So it is with machine tools. The machine you bought ten years ago may still be working just as good as ever. Yet by today's standards of production speed and economy, that same machine can be *losing money* — perhaps more than a new machine would cost.
This "creeping obsolescence" can often go unnoticed—particularly on small-lot and tool room machines that are not geared directly to a fast-moving automated production line. So take a good look at the old universal Bore-Matics, Rotary Surface Grinders, Tool-Room and Plain Internals in your shop. Check their production and maintenance costs. The results may surprise you.
Your Heald sales engineer will be glad to help you evaluate these machines, fairly and squarely — to show you whether they are earning money for you, or losing it. If you find that you're *paying* for a new machine, you might as well *have* it!
IT PAYS TO COME TO HEALD
HEALD
THE HEALD MACHINE COMPANY
Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts
Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



Finished to run without a . . .

drop of oil



Osborn's Brushamatic 3A is one of a complete line of Brushamatic finishing machines for semi-automatic or completely automated finishing.*
*Trade-Mark

MORE precise finishing of parts is vital to the continuing improvements in jet aircraft components. Fuel pump gears, shown above, are an example.

Unlike the original oily, kerosene-type fuels, today's jet fuel has extremely low lubricating quality. Brushing to remove burrs—blend surfaces and edges of teeth—is an important early step in producing the micro-finish that permits fuel pump gears to run at speeds to 3500 rpm, under pressures to 900 psi . . . without lubrication. Higher finishes are also reducing torque, greatly increasing equipment service life.

An **O**sborn **B**rushing **A**nalysis can point out ways to improve your finishing operations. Ask about it today. Write *The Osborn Manufacturing Company, Dept. G-42, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

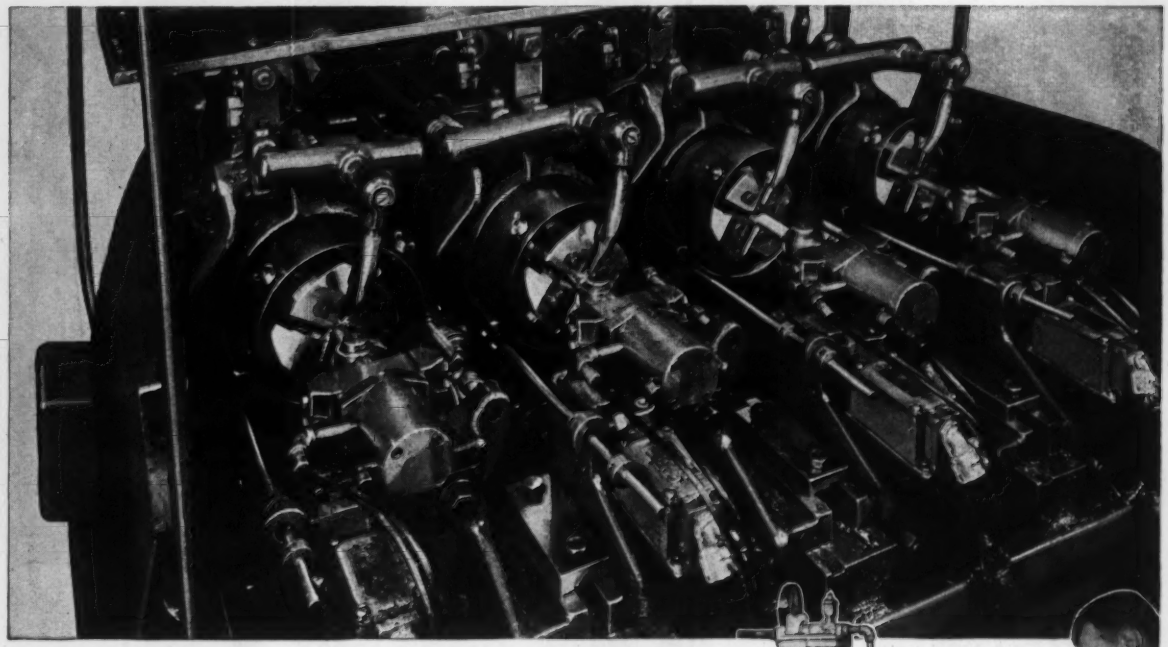
Osborn Brushes

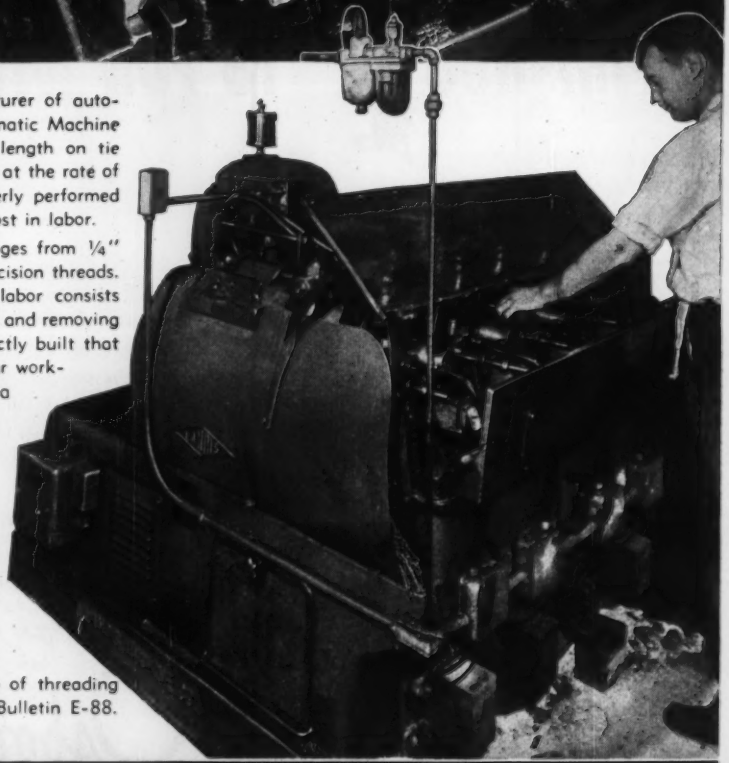
OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

Labor Cost Slashed 50%

...WITH ***LANDIS*** SEMI-AUTOMATIC MACHINE





Illustrated in the plant of a large manufacturer of automobile parts is a LANDIS 4 Spindle Semi-Automatic Machine mass-producing 7/16" 18-P threads 2¼" in length on tie rod sockets. The threads are cut to a Class 3 fit at the rate of 520 pieces per hour. This operation was formerly performed on a double-spindle machine . . at twice the cost in labor.

This machine, whose diametrical capacity ranges from ¼" to 1", is designed for the mass-production of precision threads. During the operation illustrated here, manual labor consists merely of placing the blanks on work-holding pins and removing them when threaded. The machine is so compactly built that one operator can easily reach any one of the four work-loading stations from a fixed central position—a feature which enables one man to do the work of two with minimum operating fatigue.

Through the combined output of four die heads, high production is obtained at comparatively low spindle speeds. This feature not only results in finer thread finish, but also greatly extends chaser life, thus effecting a sharp reduction in tool cost. Other advantages inherent in the LANDIS 4 Spindle Semi-Automatic Machine include: quick set-up; thread concentricity; elimination of side-shave; and adaptability to a wide range of threading operations. For complete information, write for Bulletin E-88.

LANDIS *Machine* COMPANY · WAYNESBORO PENNSYLVANIA

STEEL
The Metalworking Weekly

MARCH 26, 1956
Vol. 138 No. 13

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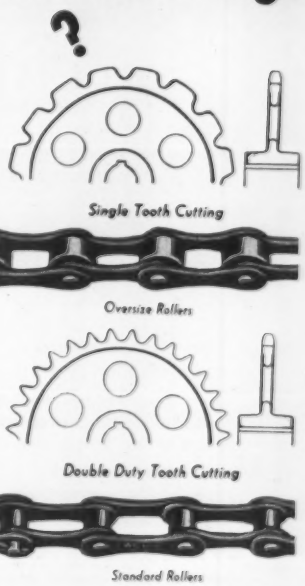
Which Sprocket will live longer



Here is double pitch chain applied on both a single and double duty tooth form sprocket. The single duty sprocket is necessary for use with double pitch chains using oversize rollers. The double duty sprocket used with double pitch chain having standard diameter rollers, has another 'life' by simply moving the chain up one tooth after it is worn in its first position. Double duty cutting in many cases, doubles the life expectancy of a sprocket.

NEW CATALOG

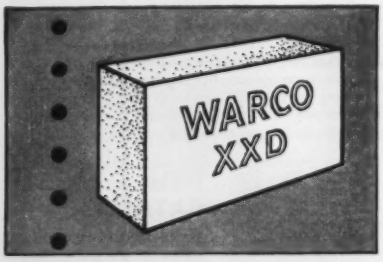
Information like this, plus other valuable chain data yours free. Write Acme Chain Dept. 10V, Holyoke, Mass.

Acme Chain Corporation
HOLYOKE MASSACHUSETTS

TARGET FOR TODAY

Today, the choice of the right refractory is more important than ever before. That means choosing a refractory with a combination of physical characteristics such as Warco XXD. With lower porosity and higher bulk density, Warco XXD, High Duty Fire Brick, is noted for unusual resistance to thermal shock. Especially recommended for checker brick work in open hearths, hot blast stoves and for use in soaking pit coping tile, Warco XXD is the last word in physical properties that assure greater value per dollar invested.

Dry press process. In standard sizes and many special shapes. Write for details.



Specialists in Refractories of High Bulk Density and Low Porosity.

WALSH REFRACTORIES CORPORATION

101 FERRY ST. • ST. LOUIS 7, MO.

FOR OVER 60 YEARS MANUFACTURERS OF HIGH GRADE REFRACTORIES

behind the scenes

Chit Chat About Chits

The spirit of service simply permeates the organization that produces STEEL each week. This devotion sometimes exceeds the call of duty, as witness the case of James Morrissey, STEEL's hustling Washington editor: Jimmy allowed himself to grow concerned over a fragment that appeared here two months ago. Anxious to backstop a play that might have sailed right past us, honest Jimmy fell upon his typewriter and pecked out the following:

"In Behind the Scenes of Jan. 23 you had an item on an Indian (Indian Indian, that is) company that sent STEEL a query. You said they were 'awaiting an early compliance.' Some guys (faithful readers of yours, too) complain that you never have told if this company got its answer. I sort of wondered about it when I read the column.

"How about it? If they didn't get an answer that satisfied them (heaven forgive me for even thinking such a thing), send me the details, and maybe I can get somebody down here in the government who gets paid for answering just that kind of question to help them out."

Thank you for your interest, Jimmy, and thank those "some guys," too, for confessing any concern whatever in Shrdlu. Frankly, they interest me more than the Indian Indian. Well, you may all relax. The company was answered by Edwin Bremer, metallurgical editor of *Foundry*. He's generally regarded as a highly qualified expert on melting practice.

"There's seldom any reply or acknowledgement to answers we send," remarked Mr. Bremer, beaming kindly through his spectacles. "I expect we'd hear quick enough if we gave somebody a wrong steer, though. So you see, in these instances, silence is golden."

Yes, sir, and virtue, it seems, is its own reward.

Found in Right Places

In the February, 1956, issue of *Fortune*, on page 53, is a splendid four-color, full-page ad by Globe-Wernicke, Cincinnati manufacturer of fine and distinctive office furniture. The illustration shows a six-piece set—bookcase, telephone stand, desk, table and two chairs. While each piece is well made, and has much to recommend it, our interest was greatest in the table in the foreground, because right spang in the middle lies a copy of STEEL. Our trusty magnifying glass revealed that it was a Nov. 23, 1953, copy, featuring an article called "Pick the Right Arc Welding Method."

Now, was that an old, beaten up copy? Or was the photograph made in 1953, and kept on ice? Or does *Fortune* lock up its forms a couple of years early?

Delayed Explanation

Advertising and sales personnel of the Riverside Metal Division, H. K. Porter Company Inc., assembled Mar. 6 at their Riverside, N. J., plant, to cook up a story that would explain recent necessary price increases in copper-base alloys. Vice President W. Harvey Thompson pleaded and exhorted, but nobody could come up with anything that sounded like a legitimate, or rather a plausible explanation of the price jump. The meeting was gloomily adjourned.

At 6 a.m. the following morning a ready-made story was presented to Riverside's advertising manager, T. F. Mead. A great commotion on her lawn fetched her out of the hay in time to observe the Riverton, N. J., police tripping up a thief who was just about to decamp with a mess of copper rain spouts from Mrs. Mead's home.

Moonshiner's Tank

The cipherogram we had a few weeks ago was "POLICE GRILLE SUSPICIOUS ROGUES," and added up to "SUSEULPSEG," which was the line that didn't make sense. Of course, "GRILLE" doesn't make sense, either—unless, by some strong stretch of the imagination you might assume the rogues were being screened. Speaking of crooks, a moonshiner, Fred Fullbright, had a cylindrical tank holding 450 gallons of his precious product. He and the tank were the same height, 6 ft. Fred's diameter was 2 ft—but what was that of the tank?

Shrdlu

(Metalworking Outlook—Page 79)

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Hot acid scrubs tomorrow's refrigerator

A typical example of B. F. Goodrich improvement in rubber

THAT sheet of steel will soon be a refrigerator—*gleaming white* because of the steaming hot acid bath.

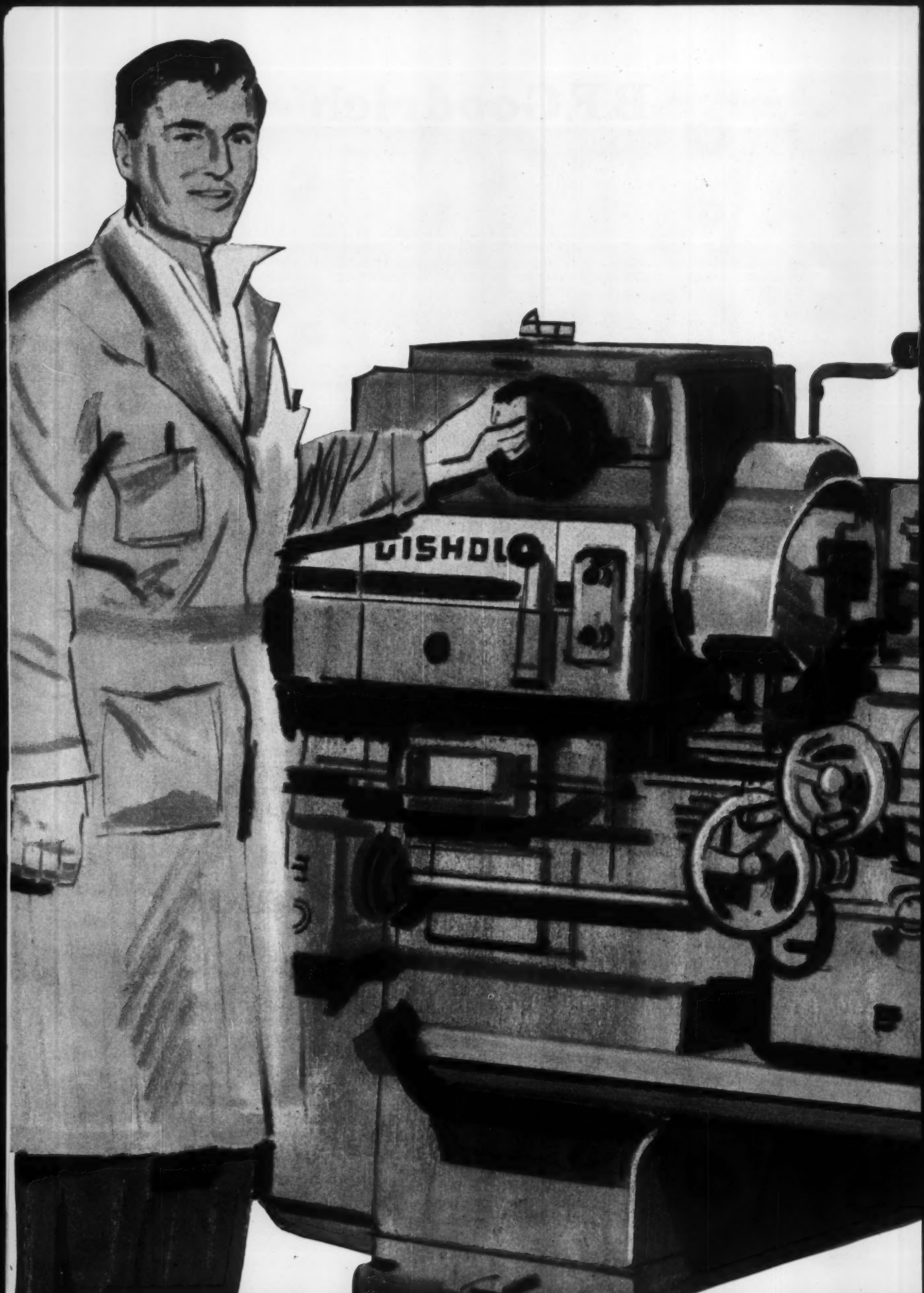
To clean rust off steel so enamel will stick, miles of sheets are run through tanks of hot acid that eats off the film of rust. B. F. Goodrich made this low-cost method practical by developing a rubber and brick tank lining that stands the hot acid and the slicing, banging of fast-moving steel.

The sheets used to move over stationary skid blocks but these soon wore out with rubbing plus heat plus acid. Now B. F. Goodrich makes a series of small rubber rolls that really turn and the one remaining reason for frequent shutdown has been cured. What's more, the new B. F. Goodrich segment rolls cost one-third less than the old-fashioned type, yet last 3 times longer.

B. F. Goodrich specializes in rubber equipment to handle acids and other corrosive chemicals. Today you'll find B. F. Goodrich rubber covered rolls and rubber lined tanks, pipes and valves in the most modern plants. More important, you'll find rubber lining in some places where it has lasted 15 and even 20 years.

When you buy B. F. Goodrich lining you buy years of engineering background with it—experience that makes sure your lining will be exactly fitted to meet all the special requirements of your work. You buy something else, too—assurance of satisfactory performance that can come only with a product that has proved itself by years of success in actual use. *The B. F. Goodrich Company, Dept. M-569, Akron 18, Ohio.*

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

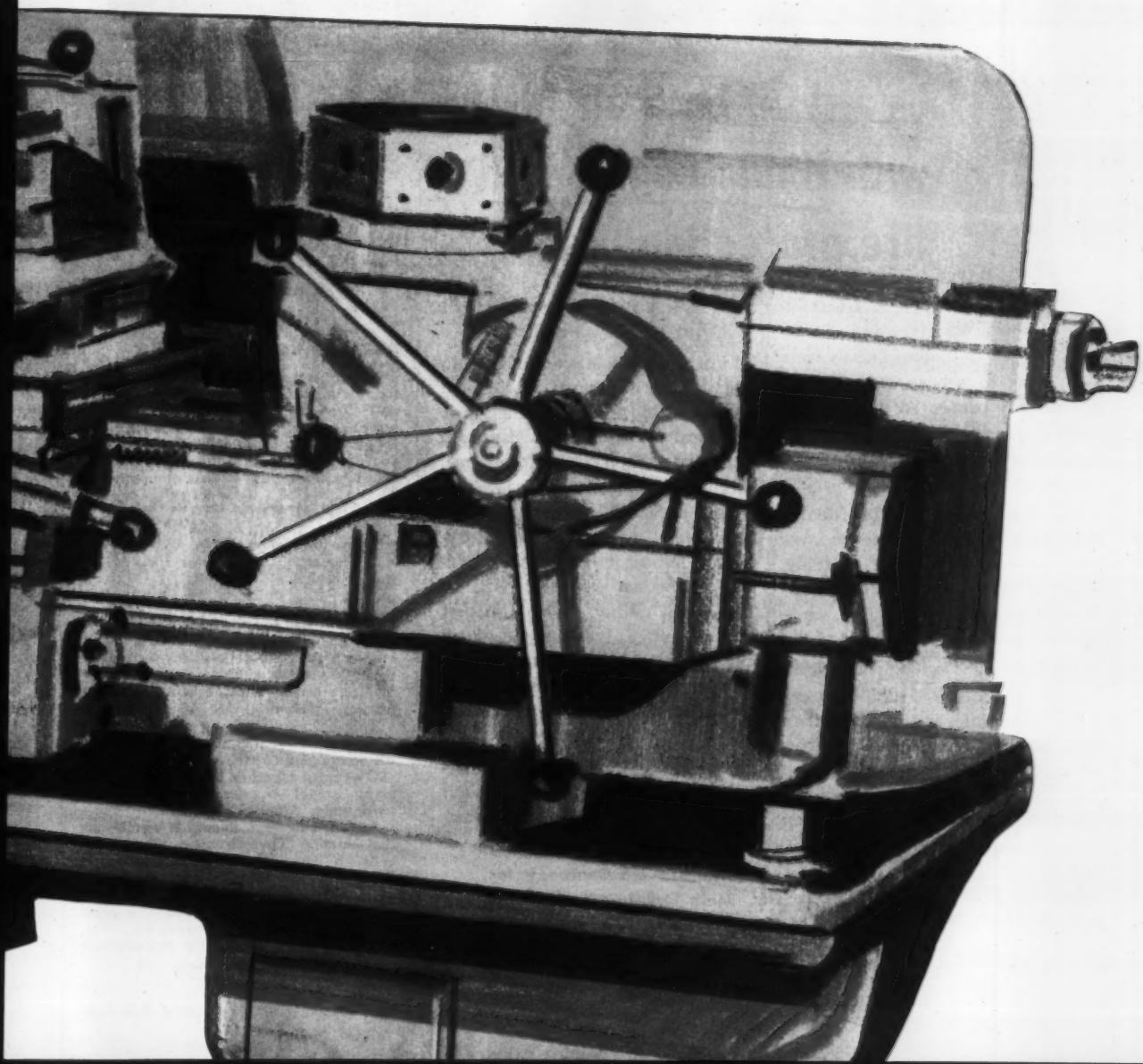

DISHDL

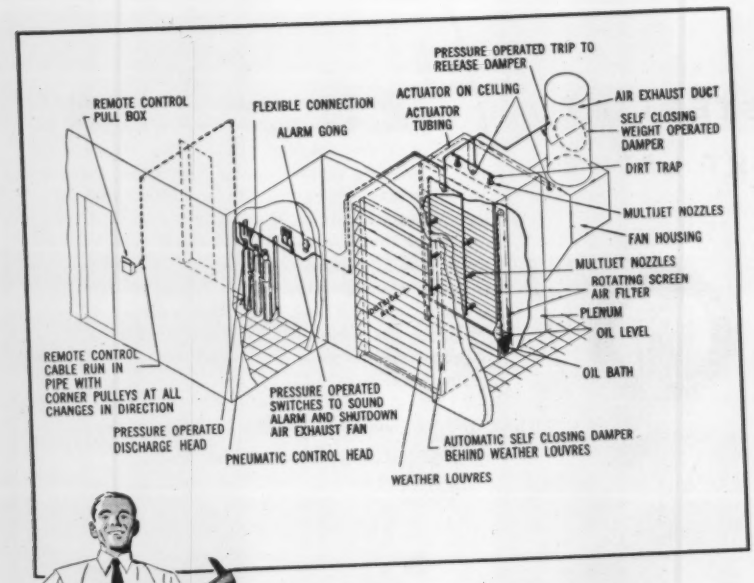
GISHOLT MASTERLINE
RAM TYPE TURRET LATHE

Here is the latest Gisholt MASTERLINE Ram Type Turret Lathe, with many improvements and outstanding features to provide faster, easier operation, higher quality, quicker setup and lower maintenance. In short, it is designed to do your work faster, cheaper and better—and with a new minimum requirement for operator skill, attention and effort. Let us tell you more about these new machines, and discuss the possibilities of their profitable application to your particular manufacturing processes.

Gisholt Machine Company, Madison 10, Wisconsin

Look ahead—keep ahead—with Gisholt





Guard oil bath air filters with Kidde engineered fire protection!

LOOK HERE — a fire hazard that could easily turn a building to a heap of cinders — *completely* protected by a tailor-made Kidde CO_2 Fire Extinguishing System! Kidde engineers haven't missed a trick!

At the first sign of fire, rate-of-temperature-rise detectors trigger the system, pressure-operated switches simultaneously close dampers, shut down fans and sound an alarm while fire-killing clouds of CO_2 stop the blaze in its tracks. What protection!

And what features Kidde systems have! Using safe, efficient CO_2, they leave no mess to damage equipment, nothing to clean up after a fire. And their special rate-of-temperature-rise detectors insure *complete* protection 24 hours a day. Kidde systems need no attendance, day *or* night!

Kidde systems have no falling weights, use no clumsy mechanical triggering methods. Pneumatic or Electrical Control Heads insure instant and complete CO_2 discharge. All moving parts of a Kidde system are self-enclosed for safety, need no replacement after a fire, have easy-to-read indicators which show at a glance whether system is "set" or "released." What's more, special Directional Valves let you guard more than one hazard from the same cylinder bank, giving you the most *versatile* protection on the market today!

It's easy to get the *best* in fire protection. For information about *your* specific problems, write Kidde today.

Kidde

Walter Kidde & Company, Inc.
360 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd., Montreal—Toronto

The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyre-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

LETTERS TO THE EDITORS

New Uses for Silicones

Your article, "151 Uses for Silicones in Metalworking" (Mar. 5, page 92), is highly informative. May I have a copy for my personal files?

W. H. Yake
Assistant Staff Engineer
American Kitchens
Division—Avco Mfg. Corp.
Connersville, Ind.

In regard to this article, I would like some information on whom to contact about a silicone paint that could be used to paint the exterior of a zinc phosphating machine.

James E. Hartwell
Laboratory Technician
Ohio Corrugating Co.
Warren, O.

• *Write Dow Corning Corp., Midland, Mich.*

Management Learns To Weld

Please send six tear sheets of your interesting article, "The Brass Takes a Welding Course" (Feb. 20, page 108). You might like to know that we have in our library a complete file of STEEL from Jan. 1, 1949, to date.

M. Van Blaricom
Chief of Research & Development
Houston Pipe & Steel Inc.
Houston

Adhesive Bonds Metal

We are interested in the new adhesive for metal-to-metal bonding, designated as P-262A. Developed by Bjorksten Research Laboratories Inc., it was described in the Technical Outlook column of Feb. 20 (page 107). We would appreciate receiving the address of this company.

E. A. Isaacson
Crompton & Knowles Loom Works
Worcester, Mass.

• *Write Dr. Johan A. Bjorksten, Bjorksten Research Laboratories Inc., Madison, Wis.*

Left Hand Vs. Right Hand

In the Feb. 13 issue, you had an interesting story, "New Mill for Germany" (page 53), about the new cold mill built by Continental Machine & Foundry for August Thyssen-Huette of Germany.

This cold mill is only part of a fully integrated sheet making plant. Many of the components of the hot mill, which itself was put together by Demag of Germany, are of American manufacture or built under American license.

As an educated guess, I would say that August Thyssen must have spent between $5 million and $6 million in the U. S. for this new plant.

In your article, you say quite accurately that this kind of two-way business cements relations between countries.

In the same issue is a short notice

(Please turn to page 12)

WHY GROWL . . .

. . . OVER YOUR GRINDING WHEEL PROBLEMS? You'll solve them easily when you switch to CINCINNATI (PD)* GRINDING WHEELS. Because *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—the most talked about development in years. Positive Duplication is a remarkable achievement in precision manufacturing and quality control that can *save you money . . . and increase your production.*

Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS are priced no higher than ordinary wheels.

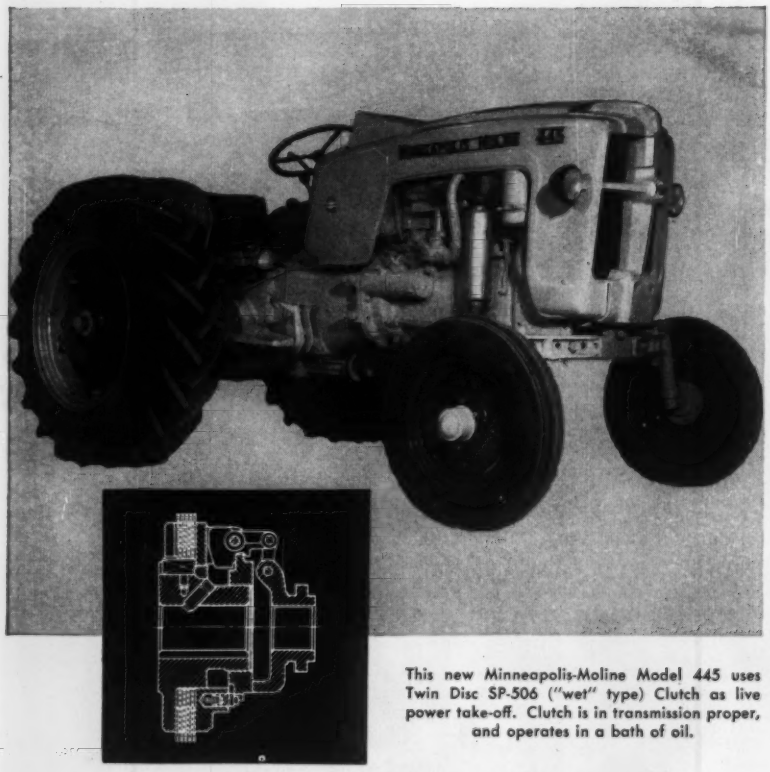
Let us sink our teeth into your grinding wheel problems, and we'll have you purring like a kitten. Contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Remember . . . *only* CINCINNATI Grinding Wheels give you . . . (PD) POSITIVE DUPLICATION.

CINCINNATI* *Grinding Wheels*

A Production-Proved Product of THE CINCINNATI MILLING MACHINE CO.

*Trade Mark Reg. U. S. Pat. Off.



This new Minneapolis-Moline Model 445 uses Twin Disc SP-506 ("wet" type) Clutch as live power take-off. Clutch is in transmission proper, and operates in a bath of oil.

Twin Disc provides specific answers to clutch and power take-off problems on tractors

For more than *30 years,* Twin Disc Engineers have worked closely with designers and manufacturers of farm machinery — to provide *specific answers* to their clutch and power take-off problems.

A typical example of this long, successful relationship is the *custom designed* SP-506 ("wet" type—multiple plate) Clutch used as a live power take-off on the new Minneapolis-Moline Model 445.

In addition to farm tractors, such as this, and the Oliver Super 55 — Twin Disc products appear in a number of diversified forms — from clutches in the newest Case Field Forage Harvester to torque converter components in the newest and largest crawler tractors, manufactured by Allis-Chalmers, Caterpillar and International Harvester.

Twin Disc is prepared to *custom design* clutches for *your specific needs* —using many standard components to create *minimum tooling charges* and *low unit prices.* If you have a clutch or power take-off problem, write or call Twin Disc Clutch Company, Racine, Wis.

TWIN DISC

TWIN DISC

Friction Clutches and Fluid Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Tulsa

LETTERS

(Concluded from page 10)

that the Small Business Committee in Congress is going to launch an investigation of purchases of foreign machine tools by the government.

I am wondering why it is cementing relations if we sell abroad, but bordering on subversion when our customers want to sell something to us?

When will the left hand find out what the right hand is doing?

Kurt Orban
34 Exchange Place
Jersey City 2, N. J

Unintentional Oversight

In the Feb. 6 issue, I find an article, "Continuous Galvanizing Hits Its Stride" (page 122). Although it avoids my name as the inventor of this method . . . the article has a certain advertising value for us. I would like to order 500 reprints.

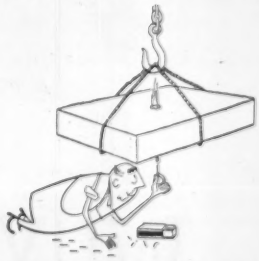
T. Sendzimir
Vice President
Armzen Co.
Waterbury, Conn.

Salesmen To Be Told

We noted with interest your article, "What Metalworking Management Expects in 1956" (Jan. 2, page 105). May we have 35 reprints to distribute to our sales representatives in the U. S. and Canada.

W. F. Stalder
Advertising Manager
C. A. Norgren Co.
Englewood, Colo.

Flame Melting of Concrete



On page 116 of the Mar. 5 issue is a short article, "Melts Concrete," on an oxyacetylene method of cutting concrete. This subject is of great interest to my engineers and me. We would appreciate further information.

S. E. Carpenter
Manager
Buildings & Equipment Engineering
Lockheed Aircraft Corp.
Burbank, Calif.

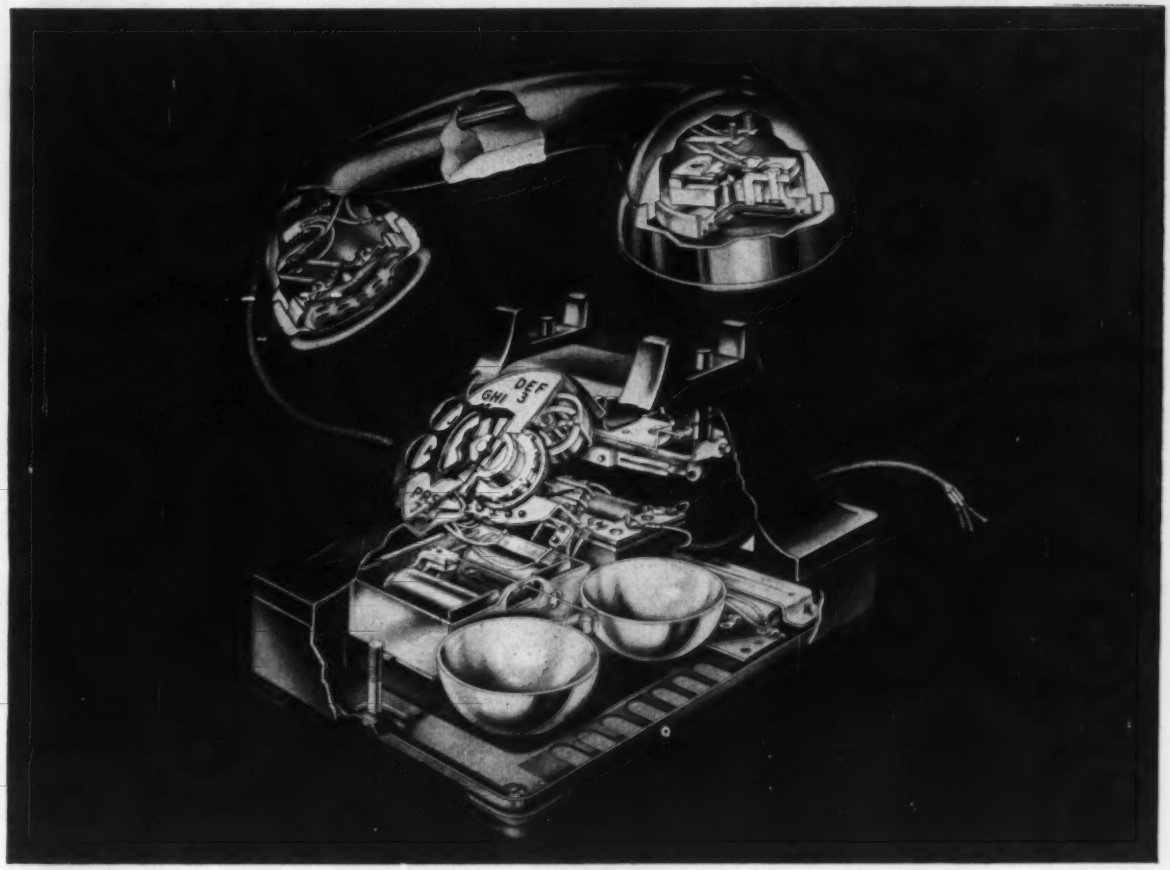
• *Write Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.*

Tungsten Data Needed

In the Jan. 9 issue in the Technical Outlook column (page 57) appears a paragraph, "Tungsten Study." It would be appreciated if you could furnish more detailed information on the subject or a source for further data.

Ernest J. Svenson
President
John S. Barnes Corp.
Rockford, Ill.

• *Contact the Tungsten Institute Information Service, 1757 K St. N. W., Washington, D. C. which issued the release.*



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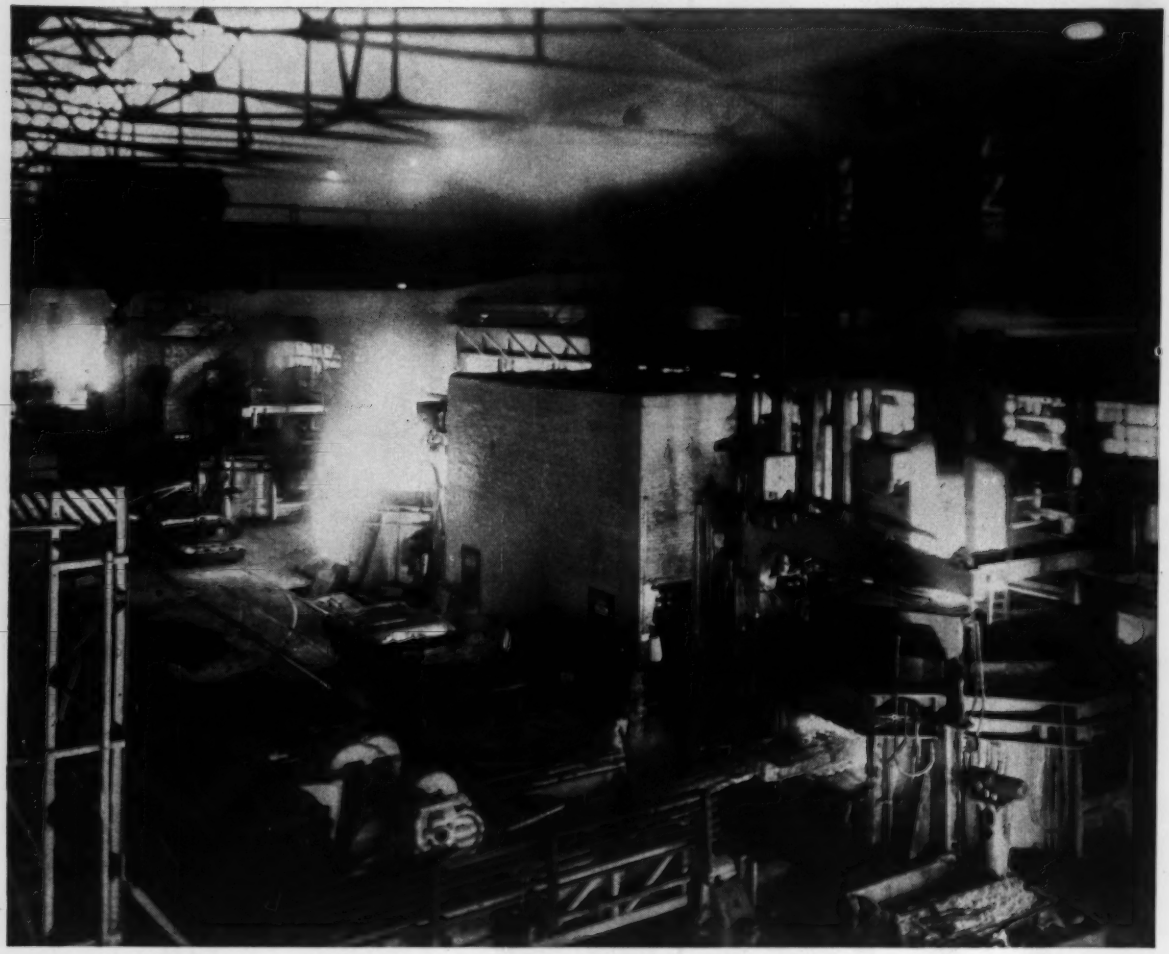


Strict Quality Control Required In Production of Stainless Steels For Critical Applications

Testing Process at Rotary Electric Steel Company Continues Through Each Step in Manufacture.

Rotary Electric Steel at Detroit produces in large volume the high quality stainless and alloy steels needed for the automotive, aircraft, chemical, anti-friction bearing, and food handling equipment industries, as well as for critical defense applications. Precise quality control and constant inspection of the steel at each processing step is basic in Rotary's production.

Raw Material—This testing process starts even before the steel is in a molten state. Rotary produces electric furnace steels. The raw material for this steel is not ore, but steel scrap. Rotary uses scrap of the highest quality, to which is added various high grade alloying elements. The first step in quality control starts with the careful selection and grading of the scrap.

Melt Shop — During the melting process frequent samples are taken

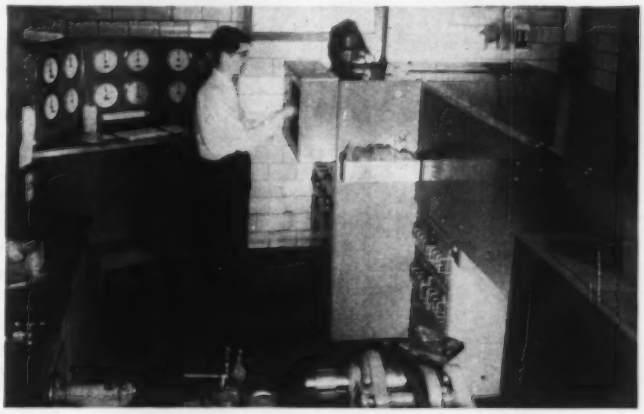
Sample is poured into small mold. Test piece is sent to chemical laboratory through a pneumatic tube for complete analysis.

and test pieces are sent through a pneumatic tube to the chemical laboratory for complete analysis. A number of the determinations are made on a direct-reading spectrometer that enables a report on the chemical analysis of the metallic elements in the steel to be made in a matter of minutes. To insure that the steel meets customer specifications, from four to six additional tests are made, and before the steel is poured from the furnace the chemical laboratory approves the heat.

Processing—As the processing continues, at various stages the steel is again analyzed chemically and samples are submitted to the metallurgical department for additional tests as required, such as etch tests, tensile tests, magnaflux tests, and cleanliness ratings.

Quality control at Rotary means that every order of steel reaching the shipping department has had metallurgical approval as well as final physical inspection.

New Color Brochure—"How Steel Is Made at Rotary" is a 4-color booklet that shows the plant and facilities of the company. Copies can be obtained by writing Rotary Electric Steel Co., Box 4606, Detroit 34, Michigan. Rotary has sales offices and agents in Detroit, Indianapolis, Newark, N. J., Cleveland, and Chicago.



Portion of the test is run in direct reading spectrometer that gives the chemical analysis of the metallic elements in a few minutes.

Results of first test are sent to melt shop by telautograph. Four to six additional tests are made at this stage alone.

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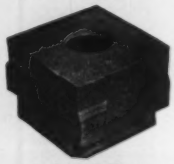

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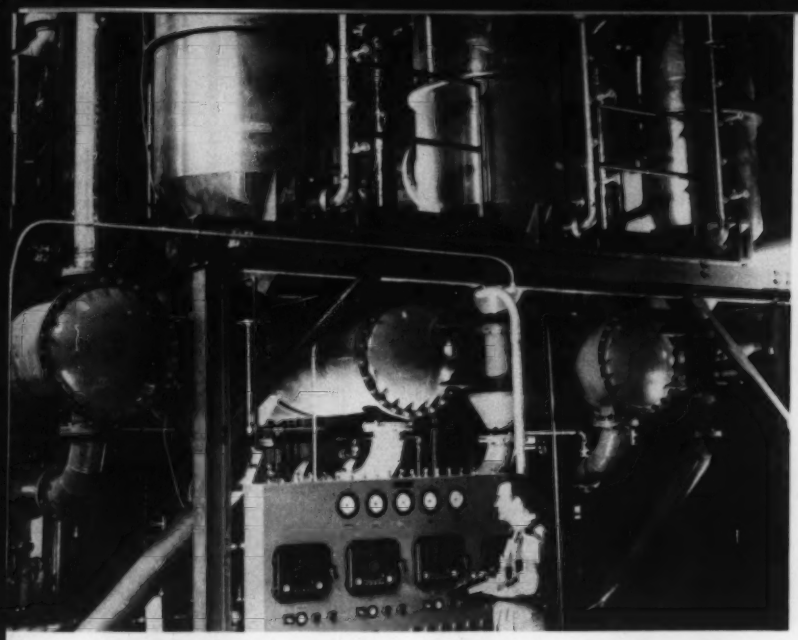
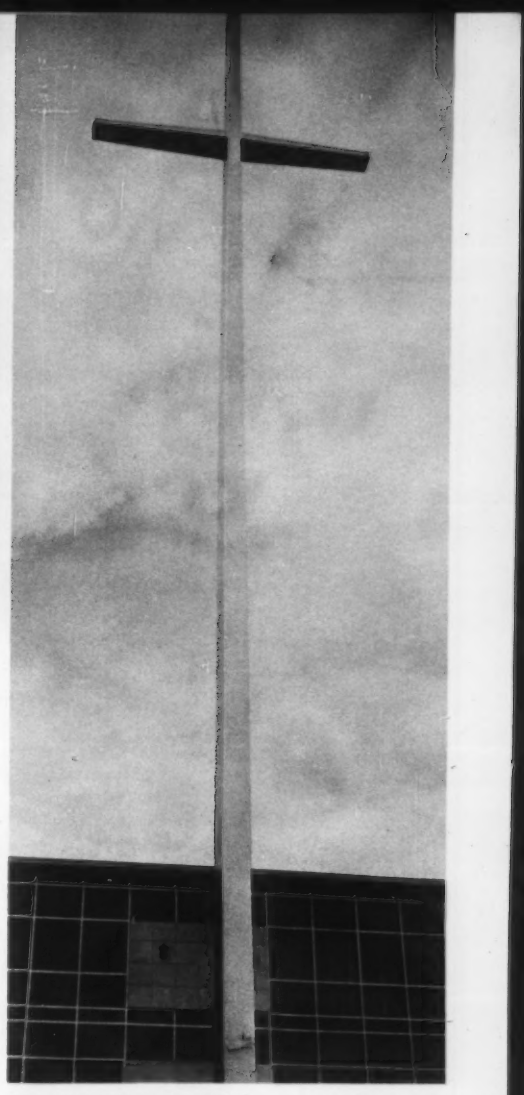


FOR CORROSION RESISTANCE. The Marathon Corporation developed a method of producing lignosulfonates from paper mill sulfite liquor, but it was impractical until Stainless Steel became available in the 1930's. The plant now produces 75 million pounds a year, and 50% of the equipment is Stainless Steel.

NOTHING *can equal* *Stainless Steel*



FOR ENDURING BEAUTY. This great religious symbol is erected on the grounds of St. Patrick's Academy, Chicago, Ill. The Stainless Steel skin furnishes a gleaming, permanent inspiration to all viewers.

• No other design material can match Stainless Steel in its *combination* of desirable properties: corrosion resistance, strength and hardness, beauty, cleanability and easy fabrication. When buying Stainless, remember that United States Steel offers the widest range of types, finishes and sizes available in the United States.

FOR WET, ABRASIVE SERVICE. Here's a Stainless Steel shaker screen in a coal plant. Management says, "Ordinary screens would only last about two weeks, but we can expect three *years* of service from these Stainless Steel screens . . ."

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USS

UNITED STATES STEEL

"It was a ticklish job — shrink-fitting the world's largest plate mill roll"

says **Harry Brinker,** *Asst. Division Supt., Homestead Forgings Division*

Although he has spent over 40 years in the forge shop, even Harry Brinker was impressed with, and proud of the arbor sleeve back-up roll shown here. It is being shipped to Ruhrstahl AG., a large German basic steel producer.

The arbor is about 29 feet long and 4 feet in diameter. It is a USS Quality Forging, heat treated and machined. Encasing this arbor is the roll body, a sleeve about 13 feet long and 6 feet in diameter. This also is a USS Quality Forging, heat treated and machined. The complete roll weighs 121 tons.

The steel is nickel-chromium-molybdenum-vanadium alloy, heat treated to 52 Shore for the arbor, and 60 Shore for the sleeve. But the tough part of this job was the shrink fit. Both pieces had to be machined with great care. Then the outer piece was heated and slipped over the arbor, using carefully developed techniques to position it exactly before it cooled and shrank to form an inseparable bond with the inner piece. In fact, it was U. S. Steel's unique experience with this type of fabrication that led Ruhrstahl to come 4,000 miles for this roll—the largest of its type ever produced.

USS Quality Forgings are discussed in a booklet that is free upon request. Please address inquiries or requests for the booklet to United States Steel Corporation, Room 5252, 525 William Penn Place, Pittsburgh 30, Pa.

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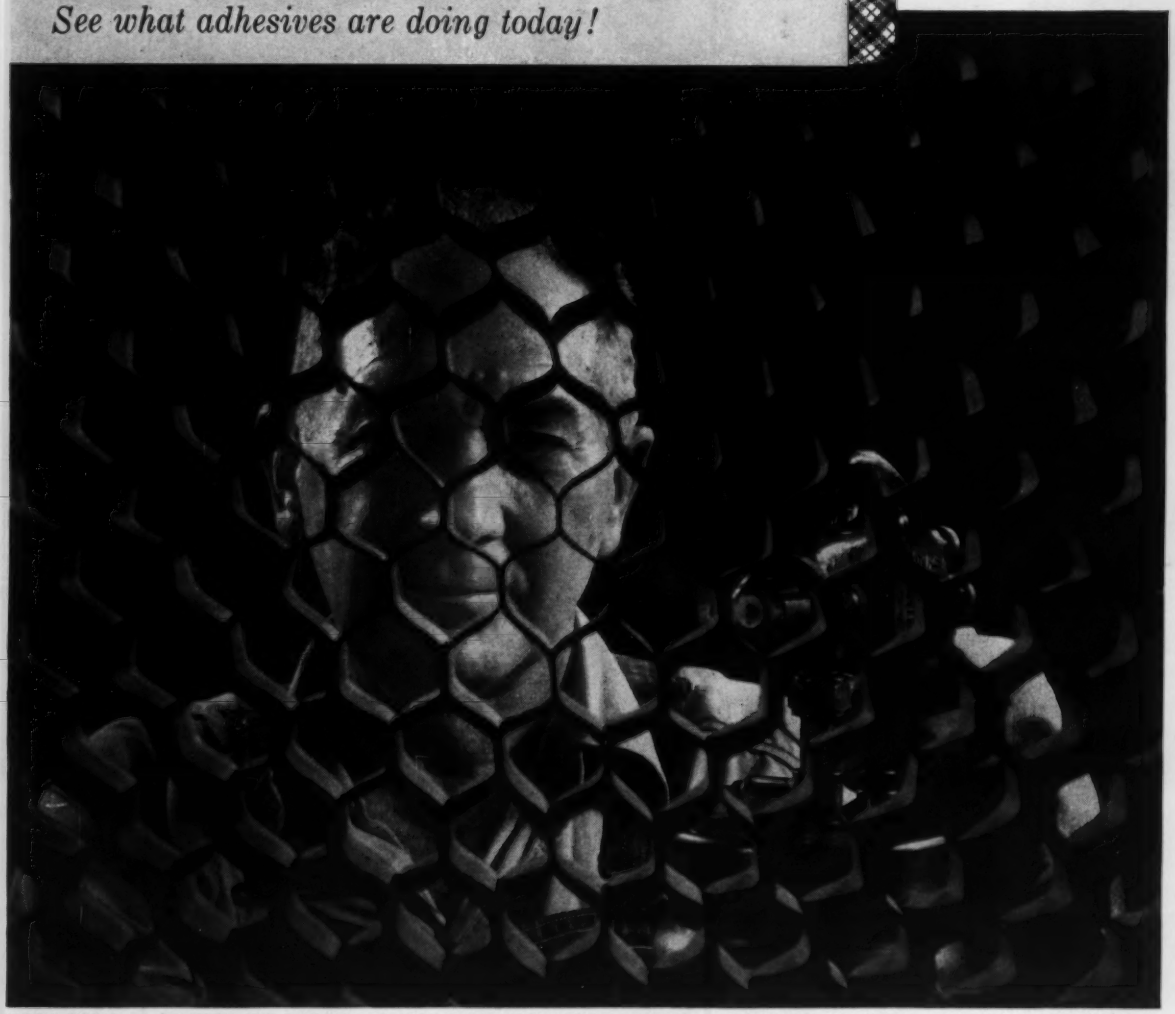

WHEN THIS MAN SQUEEZES THE TRIGGER, HE CUTS PRODUCTION COSTS. HIS SPRAY GUN IS LOADED WITH A MODERN ADHESIVE BY 3M.

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3M adhesives like EC-1357 and EC-1177 bond a honeycomb paper core between thin metal skins. They produce rigid, more durable units from such light materials because they're tougher, more flexible. Many industries benefit: building, furniture, aircraft, railroad equipment and others.

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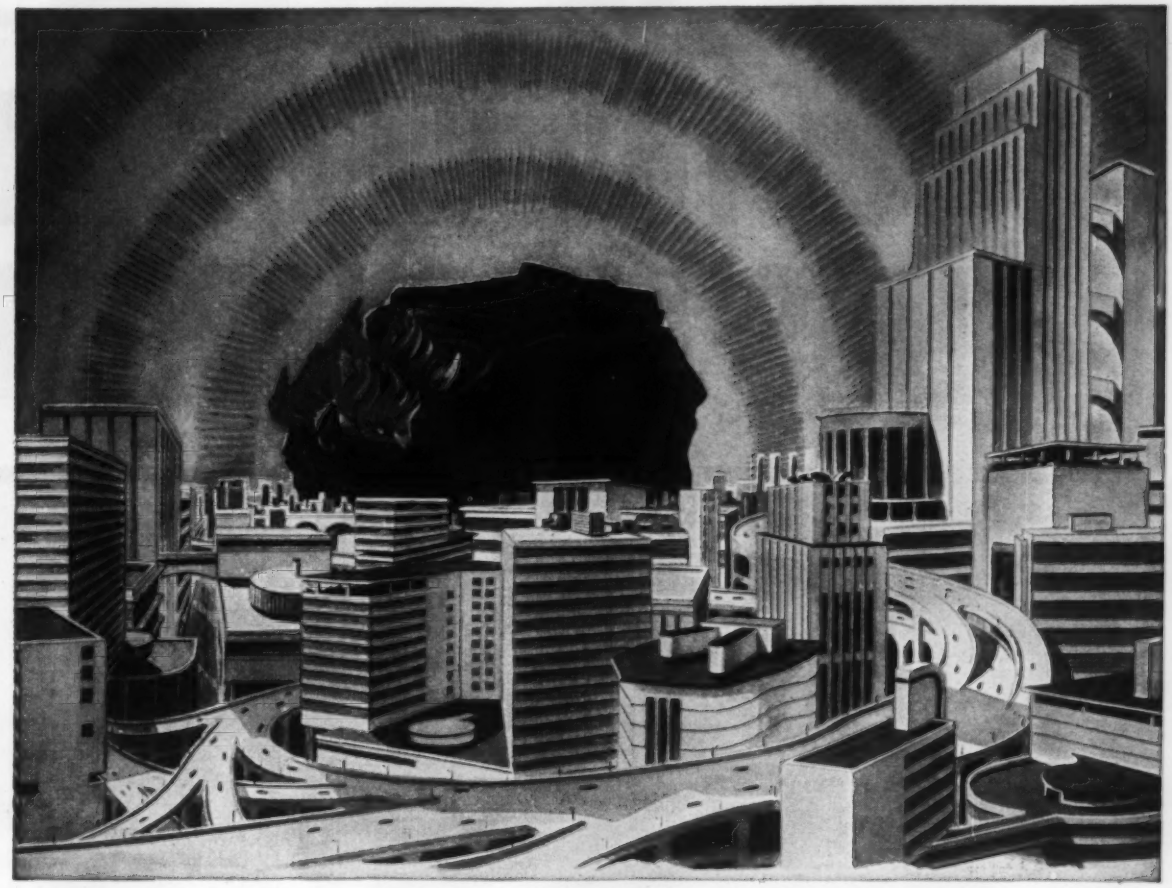

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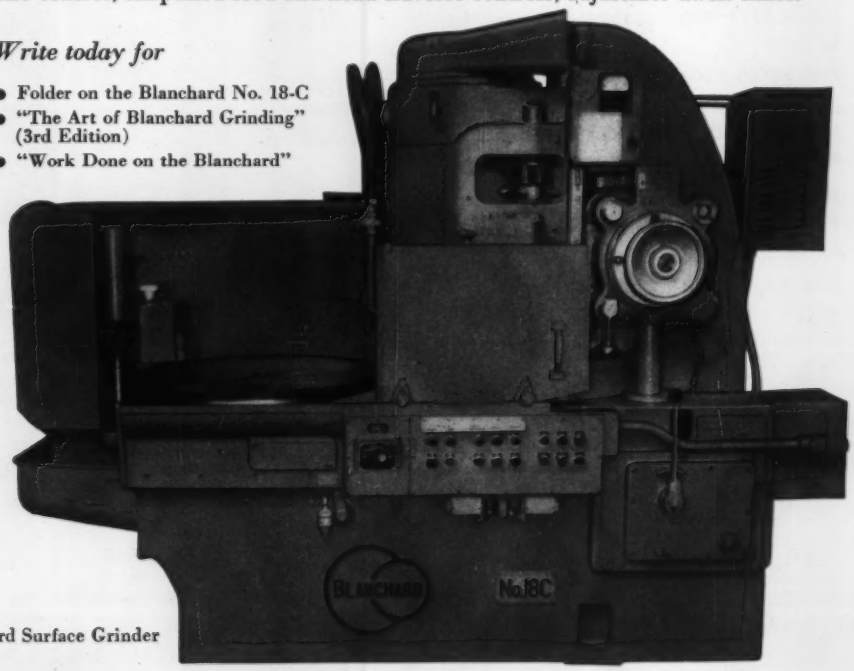

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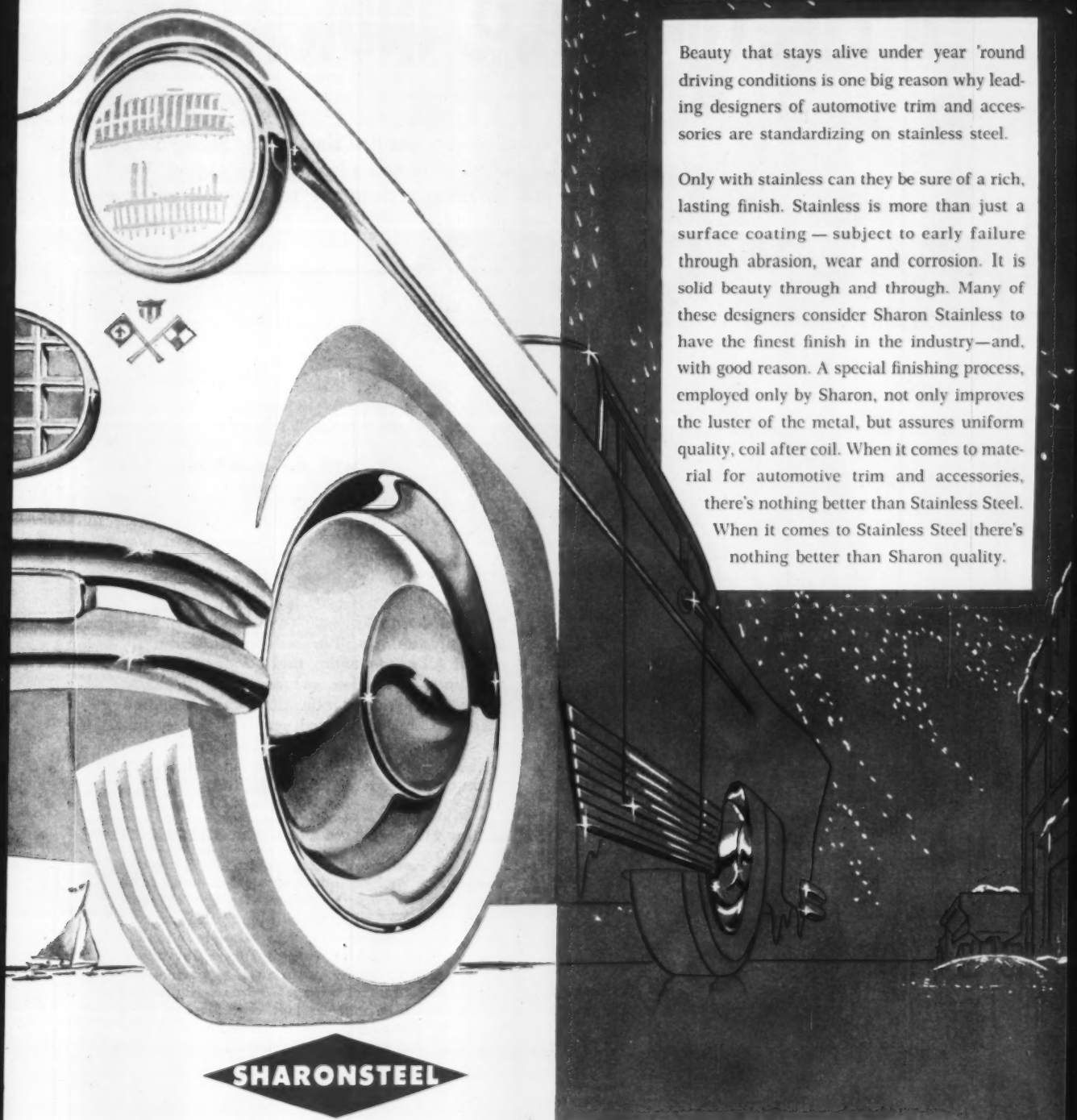
SHARON STAINLESS ASSURES LASTING BEAUTY



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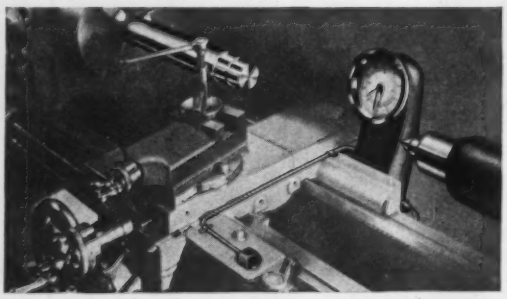

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Apr. 1-5, American Society of Mechanical Engineers: Oil and gas power conference, Jung hotel, New Orleans. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 4-6, American Institute of Steel Construction Inc.: Spring meeting and national engineering conference. Lehigh University, Bethlehem, Pa. Institute's address: 101 Park Ave., New York 17, N. Y. Secretary: M. Harvey Smedley.

Apr. 4-6, American Society of Lubrication Engineers: Annual meeting and exhibit, William Penn hotel, Pittsburgh. Society's address: 84 E. Randolph St., Chicago 1, Ill. Administrative secretary: William P. Youngclaus Jr.

Apr. 4-6, Rail Steel Bar Association: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

Apr. 4-7, National Screw Machine Products Association: Annual meeting, Schroeder hotel, Milwaukee. Association's address: 2860 E. 130th St., Cleveland 20, O. Executive vice president: Orrin B. Werntz.

Apr. 8, Packaging Machinery Manufacturers Institute: Spring meeting, Dennis hotel, Atlantic City, N. J. Institute's address: 342 Madison Ave., New York 17, N. Y. Executive director: R. L. Sears.

Apr. 8-12, Scientific Apparatus Makers Association: Annual meeting, Belleview-Biltmore hotel, Belleair, Fla. Association's address: 20 N. Wacker Dr., Chicago 6, Ill. Executive vice president: Kenneth Andersen.

Apr. 9-11, American Institute of Mining & Metallurgical Engineers: Meeting of National Open-Hearth, National Blast Furnace, Coke Oven and Raw Material Committees, Netherland Plaza hotel, Cincinnati. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Apr. 9-12, American Management Association: Packaging conference, Convention Hall, Atlantic City, N. J. Association's address: 1515 Broadway, New York 36, N. Y. Vice president-secretary: James O. Rice.

Apr. 9-12, Society of Automotive Engineers Inc.: National aeronautic meeting, aeronautic production forum and aircraft engineering display. Hotel Statler, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Apr. 10-11, American Society of Mechanical Engineers: Machine design conference. Bancroft hotel, Worcester, Mass. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 10-12, Metal Powder Association: Annual meeting and show, Hotel Cleveland, Cleveland. Association's address: 420 Lexington Ave., New York 17, N. Y. Secretary: Robert L. Ziegfeld.

Apr. 15-19, American Hardware Manufacturers' Association: Spring convention, Roosevelt hotel, New Orleans. Association's address: 342 Madison Ave., New York 17, N. Y. Secretary-treasurer: Arthur Faubel.

Apr. 16-17, American Society of Mechanical Engineers: Gas turbine power conference, Hotel Statler, Washington. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 18-19, Bituminous Coal Research Inc.: Annual meeting, Deshler Hilton hotel, Columbus, O. Association's address: 804 Southern Bldg., Washington, D. C. Secretary: C. A. Reed.

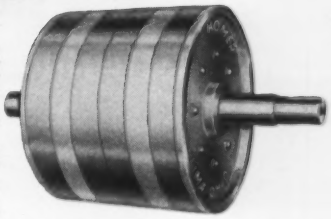
Apr. 18-19, Armour Research Foundation of Illinois Institute of Technology: National industrial research conference, Sherman hotel, Chicago. Foundation's address: 10 W. 35th St., Chicago 16, Ill.

HOMER

PERMANENT MAGNETIC EQUIPMENT FOR METALWORKING PLANTS

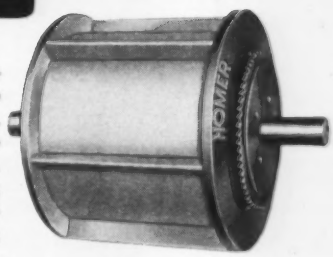
SAVE TIME . . . MONEY . . . LABOR

HOMER *HERCULES* AND *HERCULES*-SUPREME PERMANENT MAGNETIC PULLEYS



Homer Permanent Magnetic Pulleys in belt conveying systems cut costs in a multitude of metalworking operations. They automatically remove tramp iron from coke, slag, ores, foundry sand, etc. . . . sort ferrous from non-ferrous parts . . . and segregate ferrous from non-ferrous materials, minerals, etc. Trouble-free with no D.C. power supply required—no production stoppages as result of power failure. Homer's "Radial Pole Design" assures highest magnetic strength across entire working face of pulley for deep, effective penetration and positive control of magnetic materials. Write for Bulletin PY-260.

HOMER PERMANENT MAGNETIC DRUMS



Homer Magnetic Drums automatically and economically beneficiate ores . . . remove tramp iron from slag, coke, foundry sand, ores, etc. . . . and separate ferrous parts from abrasive material following tumbling barrel operations. For installation at discharge end of gravity, screw or belt conveying systems and for use with tumbling barrels. Permanent, non-electric and trouble-free—Homer Magnetic Drums require no outside power source. Homer's "Radial Pole Design," with permanence of magnetic strength guaranteed, assures maximum effectiveness at all times. Complete details in Bulletin MD-200. Write for it today.

OTHER HOMER PERMANENT MAGNETIC EQUIPMENT FOR INDUSTRY

HOMER MAGNETIC ROAD AND FLOOR SWEEPERS
Write for Bulletin MS-250

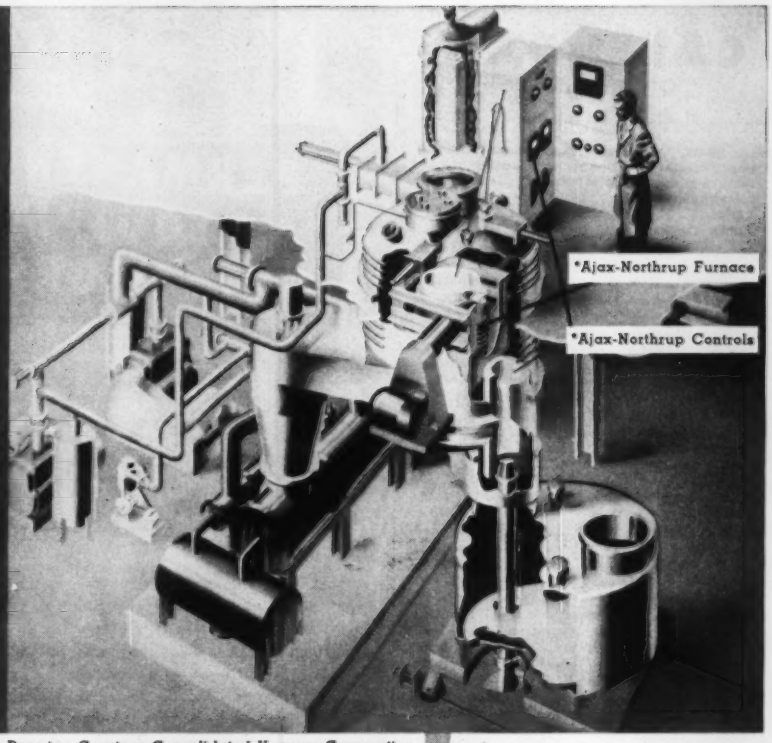
HOMER "SPACE SAVER" MAGNETIC CONVEYORS
Write for Bulletin MC-250

HOMER MAGNETIC SHEET SEPARATORS
Write for Bulletin SS-210

THE HOMER MANUFACTURING CO., INC.
DEPT. 149 LIMA, OHIO

HOMER THE FINEST IN PERMANENT MAGNETIC EQUIPMENT FOR INDUSTRY

nothing new here but the vacuum



Drawing Courtesy Consolidated Vacuum Corporation

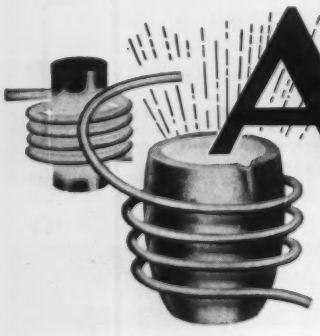
Take away the tank, a few special vacuum features and pumping equipment from this 1000 lb. capacity vacuum melting installation at the Carboloy Department of General Electric Company, and you have the same high quality AJAX-NORTHRUP furnace used for melting the finest alloys elsewhere at Carboloy and throughout the world. You can depend on AJAX-NORTHRUP furnaces for:

- *A clean melt with consistent analysis*
- *Fast, controlled melting*
- *Almost 100% recovery of scrap*
- *Amazing versatility*
- *No fumes, noise, or external heat*
- *Maximum economy and low maintenance*

*For details write AJAX ELECTROTHERMIC CORPORATION, TRENTON 5, N. J.

No induction vacuum melting installation can be any better than the high frequency induction furnace around which it is built. That's why more AJAX-NORTHRUP furnaces are used than any other for this important work.

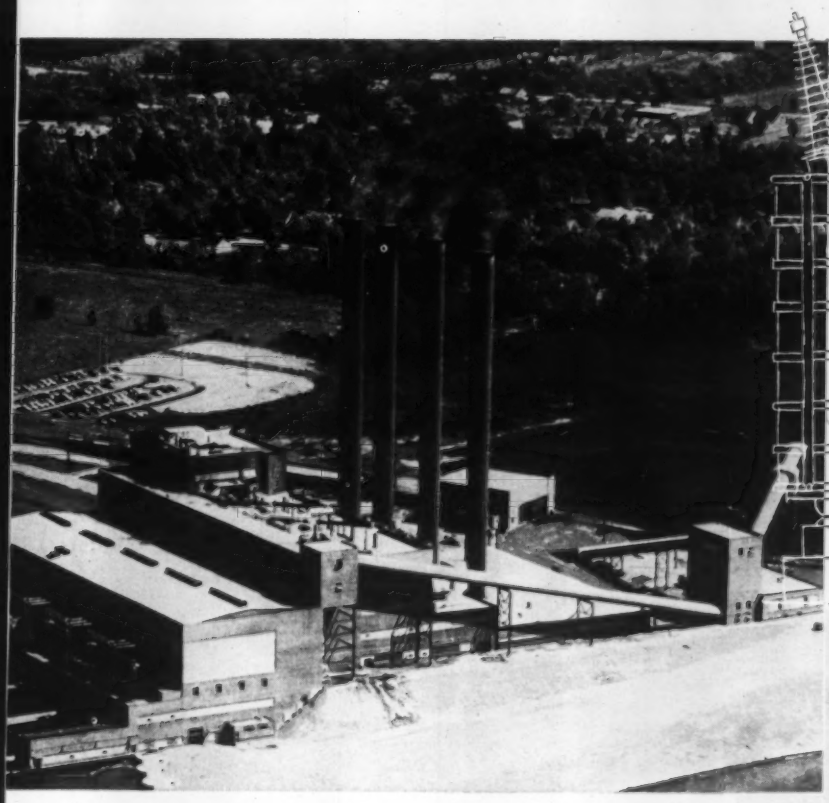
Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.

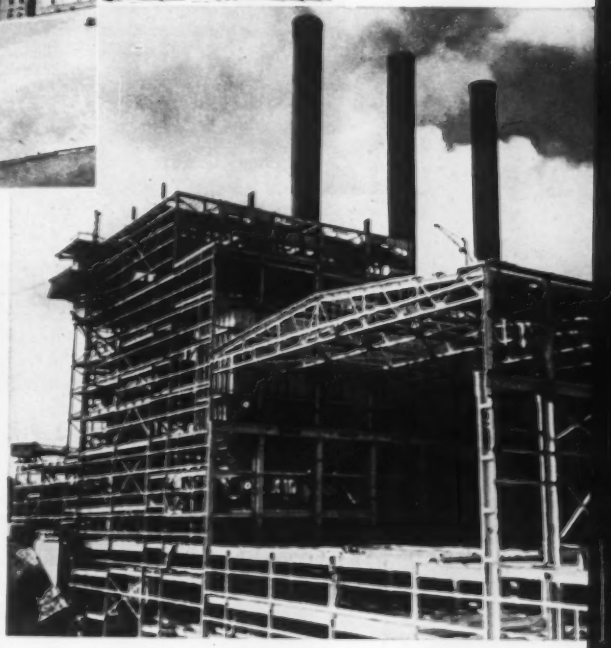


AJAX NORTHRUP SINCE 1916

INDUCTION HEATING-MELTING

MORE POWER
(HOUSES) TO YOU





The Phenomenal Growth of the utility field is vividly reflected in the vast number of new power houses which will more and more come to encompass nuclear power as well as electricity. Ingalls is the largest independent fabricator of structural steel in the country for power houses. So it is with pride we point to the "more and better" power houses of 1956. Currently, Ingalls is working on fifteen jobs of this nature. A recently completed job for which Ingalls supplied the structural steel is the #4 unit of The Cleveland Electric Illuminating Company's Eastlake Power Plant shown here. When this 240,000-kilowatt giant goes into operation early this year, it, and the three 140,000-kilowatt turbogenerators now in service, will generate enough electricity to light nearly a million homes.

If you are contemplating a new power house, or an addition to your present power houses, Ingalls offers you its service—fabricated steel, steel erection, or both. Your inquiries are invited.

FABRICATING STEEL IS OUR BUSINESS

THE INGALLS **IRON WORKS COMPANY**

BIRMINGHAM, ALABAMA

SALES OFFICES: New York, Chicago, Pittsburgh, Houston, Atlanta, New Orleans

PLANTS: Birmingham, Ala.; Verona, Pa.; Pascagoula, Miss.; North Birmingham, Ala., Decatur, Ala.

3 planers in one machine

Pendant control of range and cutting speed selection.

Maximum return speed regardless of cutting speed.

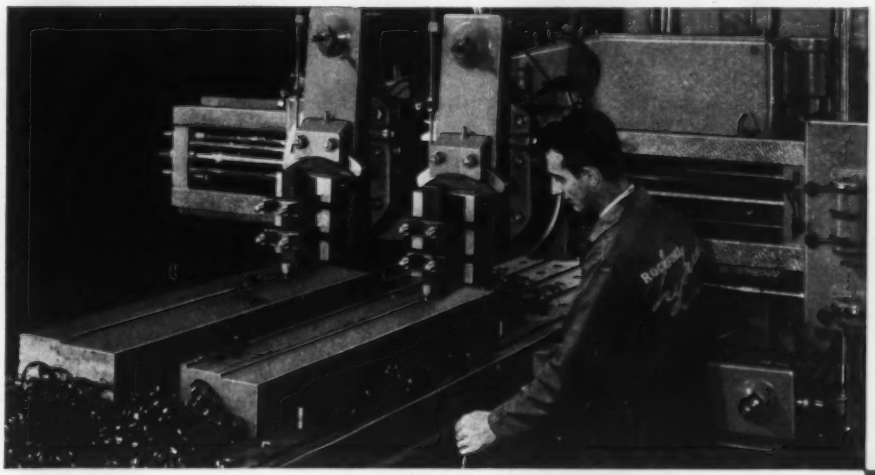
Quick reversals with minimum overtravel.

with hydraulic triple circuit

h3 drive

low speeds to 100 fpm. with force for heavy cuts
medium speeds to 150 fpm. with force for normal cuts
high speeds to 300 fpm. with force for light cuts

H3 drive is an exclusive new feature on Rockford Hydraulic Planers. In the three speed circuit, a double acting cylinder opposed by a single acting cylinder are employed, giving three speed ranges with the power inversely proportional. The hydraulic triple circuit provides the correct speed and force—in one machine—to most economically machine every type of metal. Ask a Rockford Machine Tool Co. representative for further information, or write direct.



ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

h3 drive

"Electromet" 50% Ferrosilicon

Trade-Mark

for FAST deoxidation

Dissolves fast and saves furnace time

Provides close metallurgical control

Keeps open hearth heats uniform

DENSE PRODUCT—ELECTROMET 50 per cent ferrosilicon is a uniformly dense product. The alloy penetrates the slag without delay and goes into solution fast. This provides fast blocking action and saves furnace time.

UNIFORM ANALYSIS—In every shipment of ELECTROMET ferrosilicon, you obtain a uniform product of dependable chemical analysis. This permits close metallurgical control for open hearth steel specifications.

WIDE RANGE OF SIZES—An adequate range of sizes, for both lump and crushed material, allows you to select the size best suited to your melting practice and melting facilities. ELECTROMET ferrosilicon is uniformly-sized from lot to lot.

Lump sizes are: 75 lb. x 4 in.; 8 in. x 4 in. and 5 in. x 2 in.

Crushed sizes include: 4 in. x ½ in.; 2 in. x ½ in.; 1 in. x ¼ in.; ½ in. x Down; ⅜ in. x 12 Mesh; 8 Mesh x Down; and 20 Mesh x Down.

ANALYSIS AND GRADES OF "ELECTROMET" 50% FERROSILICON

Regular Grade	Silicon . . . 47 to 51%
Blocking Grade	Silicon . . . 47 to 51%
Boron-Bearing Grade . .	Silicon . . . 47 to 51% Boron . . . 0.04 to 0.05% or higher if desired
Low-Aluminum Grade . .	Silicon . . . 47 to 51% Aluminum . . max. 0.40% or 0.10%

A SURE SUPPLY PLUS GOOD SERVICE—ELECTROMET 50 per cent ferrosilicon is ready for immediate shipment from six plants and warehouses conveniently located to serve you. Sufficient stocks are kept on hand to meet the varied requirements of ferrosilicon users. Our staff of experienced metallurgical engineers is always ready to give you technical help. For further information about ELECTROMET 50 per cent ferrosilicon, as well as other ELECTROMET ferro-alloys and metals, please contact the nearest ELECTROMET office listed below.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

Electromet

TRADE-MARK

Ferro-Alloys and Metals

ELECTRO METALLURGICAL COMPANY

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

OFFICES: Birmingham • Chicago • Cleveland • Detroit
Houston • Los Angeles • New York • Pittsburgh • San Francisco

In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

We just said-

"OUR ENGINEERING SERVICE IS FREE!"

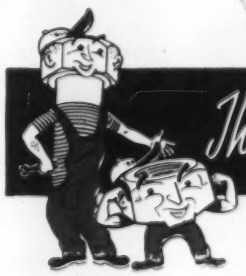
Sometimes you have to be careful how you spring surprises. For instance awhile back one of our good purchasing agent friends called us in to help him lick a tough fastening problem. We licked it all right and naturally he was very grateful.

But the excitement started when he asked what he owed.

"Nothing", we said. "Lamson & Sessions Engineering Service is *Free!*"

Well, that was too much for him—and you can see what happened.

Try "Ell" & "Ess" (that's us) the next time you need help on a fastener problem. But remember that the service is *free*. We don't want to have to revive you, too!



The LAMSON & SESSIONS Co.

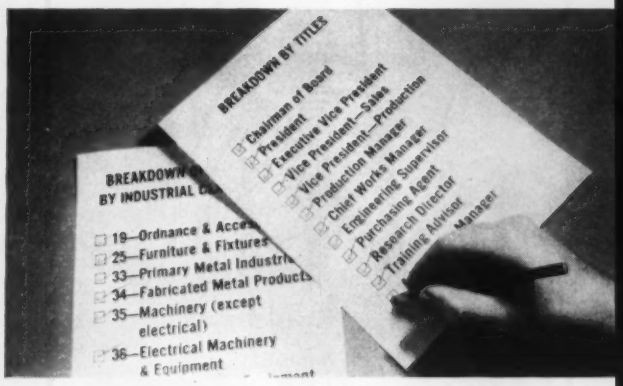
1971 West 85th Street • Cleveland 2, Ohio

PLANTS AT CLEVELAND AND KENT, OHIO • BIRMINGHAM • CHICAGO

6 ways to determine is read by the men

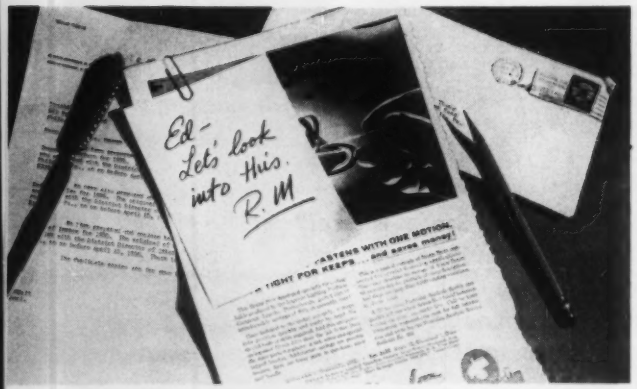
1 Check the magazine's editorial objectives and scope.

Is the editorial content *tailored* to meet the needs of the industry served? Is it in balance —broad enough to "cover the bases" yet specific enough to be of maximum value? For instance, STEEL's "3-in-1" content—news, production-engineering data, and market information—is designed to satisfy its readers, week after week.



2 Analyze all circulation policies critically.

Does the magazine make sure it reaches the titles and functions for which it is edited? Is it *flexible* to match circulation to constant *changes* in industry? STEEL's selective distribution is an example. With its Continuing Census of Metalworking, STEEL can *pinpoint* circulation . . . match it plant by plant, function by function.



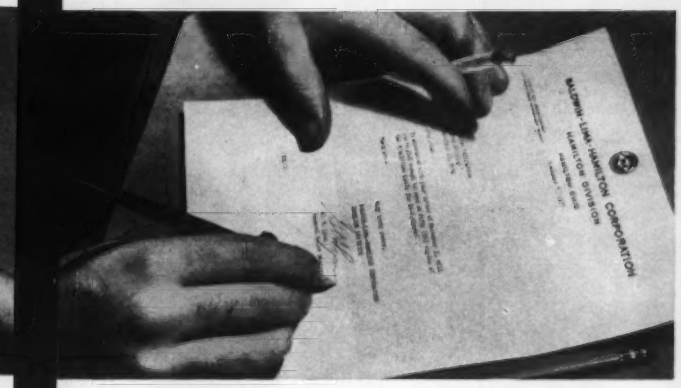
5 Find out how well readers use the advertising.

Adding up *resultful* inquiries is one way . . . provided your advertisement was designed merely to pull leads. However, like many companies, you can use with considerable success your own mail surveys to determine the degree of recognition accorded your company and your products as a result of a continuing program of advertising.

6 Look closely at published verification records.

Ask about renewal rates or other evidence supplied by the magazine that proves reader desire to receive the magazine. With STEEL, for example, a signed "reader request card" is required of every recipient. This card indicates that the recipient reads STEEL, finds it helpful, and wants to continue receiving his copy every week.

how a business paper it reaches



3 Are readers motivated to think, respond, act?

High reader reaction is one of the surest ways to measure the inherent vitality of a publication. Year after year, STEEL consistently sparks key metalworking men to request editorial material for plant meetings, technical society programs, long-term planning. Each year STEEL readers request and use over a half-million reprints.

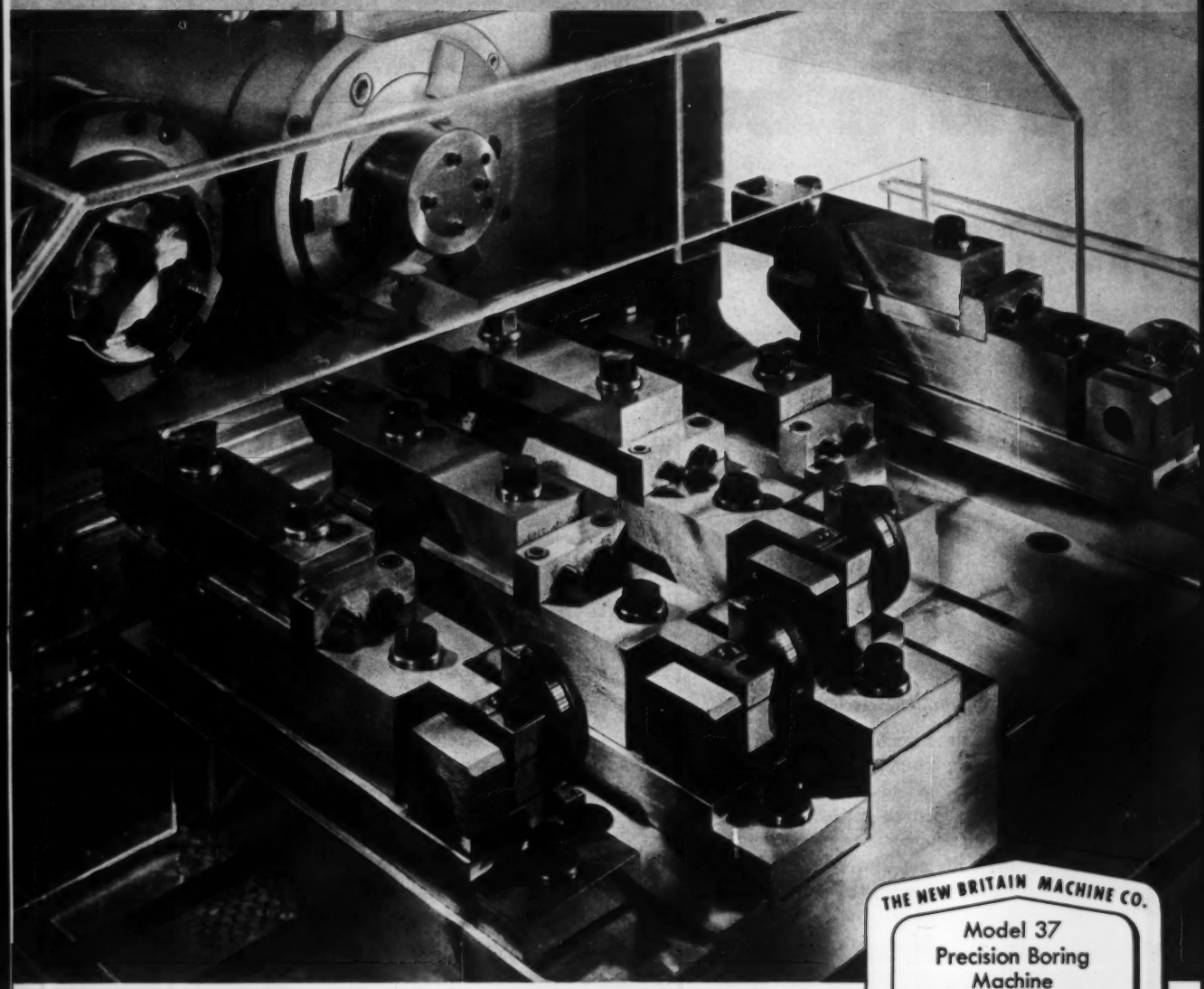
4 Does the magazine conduct its own readership test?

Is it interested enough to invest time and money in a continuing quantitative *and* qualitative readership check? For example, STEEL uses the services of both Roy Eastman and Daniel Starch as a constant check on readership of articles and advertising. Result: An ever-increasing level of high readership throughout the magazine.

Make your own evaluation of STEEL's readership through these recommended yardsticks. No other business publication gives advertisers so much proof of *high readership by the right men*. It's one reason why so many believe that STEEL is the best buy to reach the tremendously big metalworking market.

A Penton Publication

PENTON BUILDING, CLEVELAND 13, OHIO



THE NEW BRITAIN MACHINE CO.

Model 37
Precision Boring
Machine

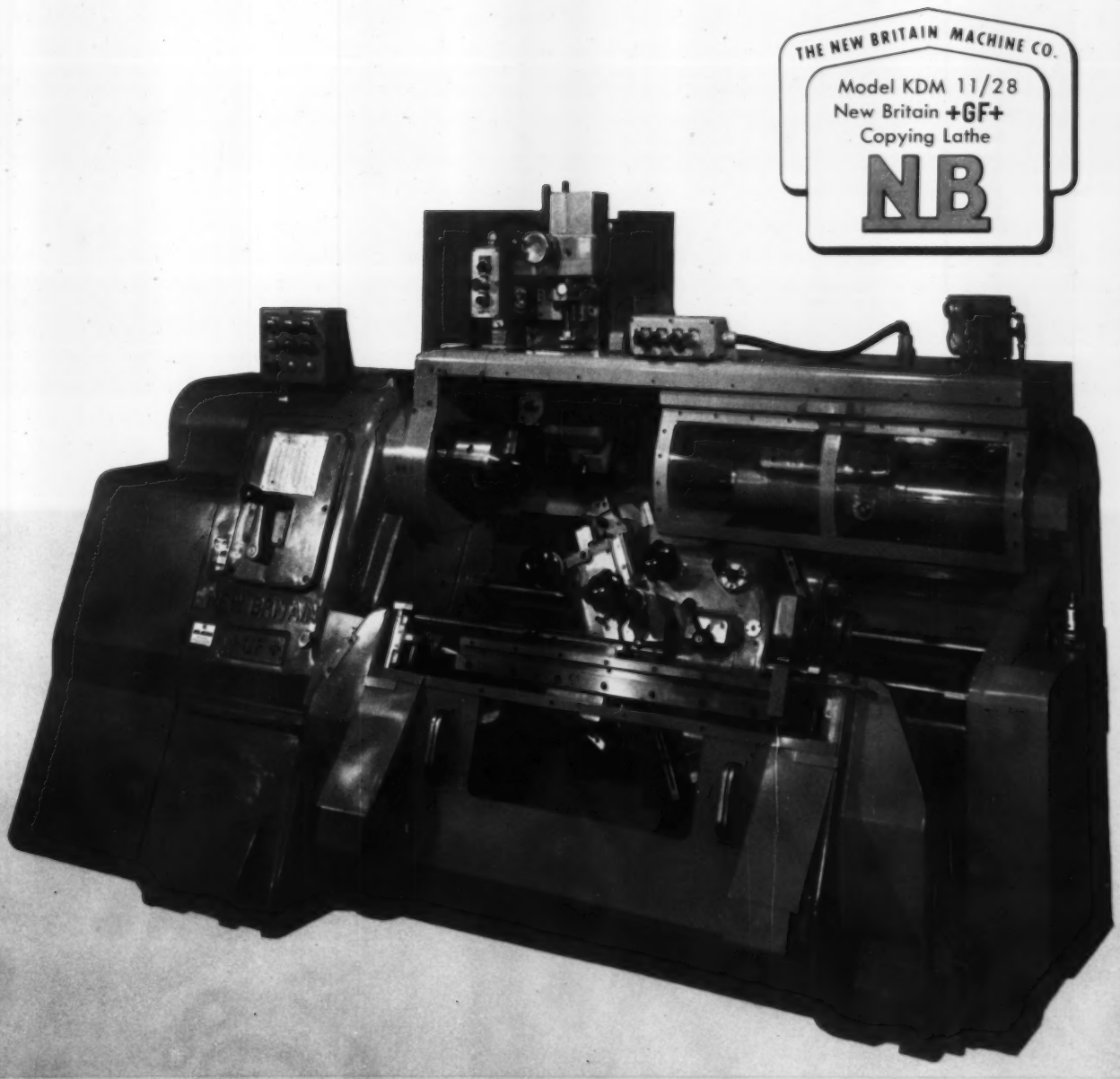
NB

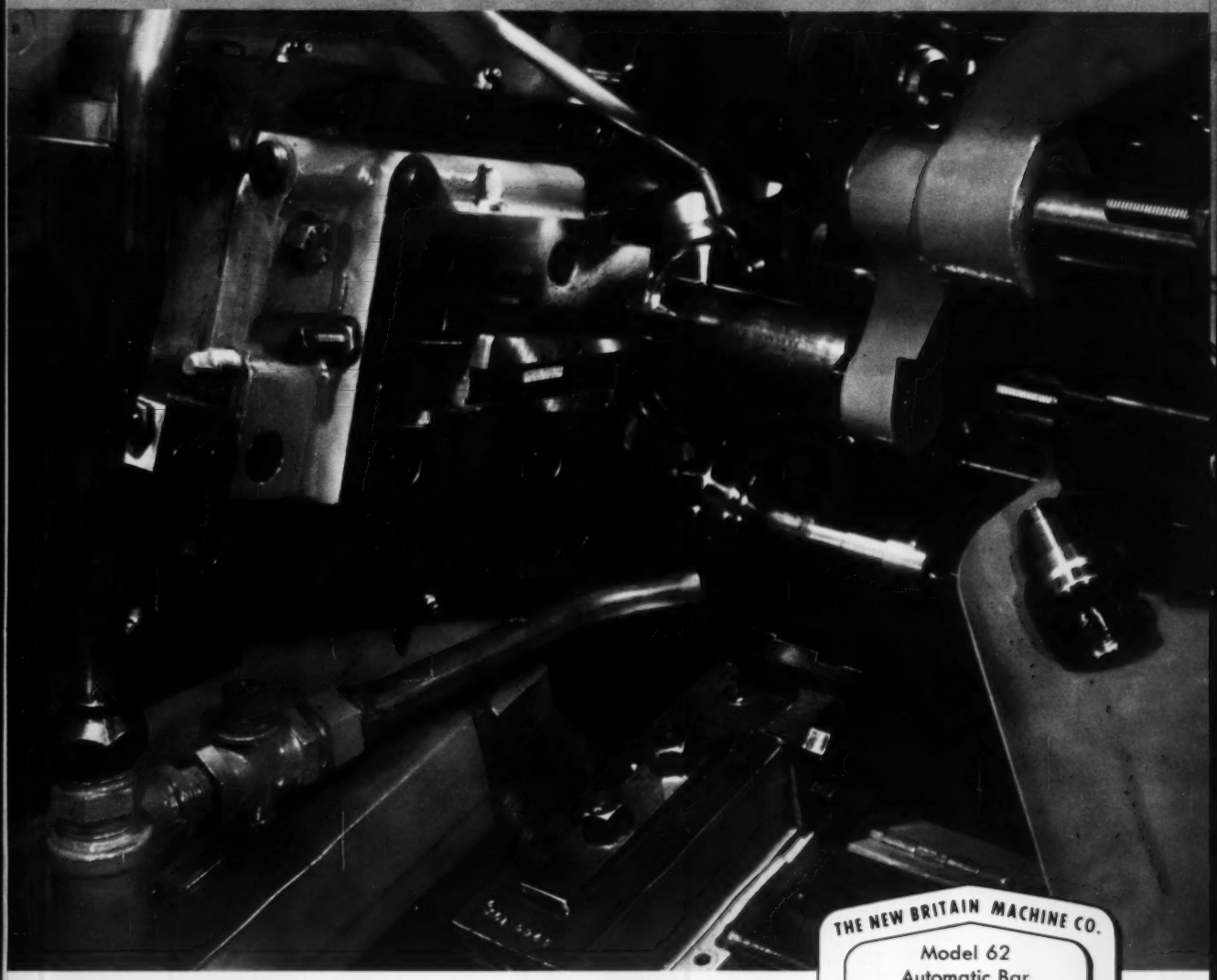
need a fresh start?

When you're stuck with "too much tooling" or costly second operations look into New Britain boring machines. New Britain's exclusive application of cam control may open up new methods, impossible on other types of machines. Low cost per piece is inherent in these New Britains, because of their versatility, high speed, high repetitive accuracy and inexpensive tooling.

everywhere you turn...

You'll find New Britain +GF+ Copy Lathes are turning out pieces at profit. With a 15-minute setup on a standard model to make just a few pieces, or with an automatically loaded production model to run a million a year, the New Britain +GF+ approach can make money for you. For a complete color motion picture demonstration in your office, consult your New Britain representative or write The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.





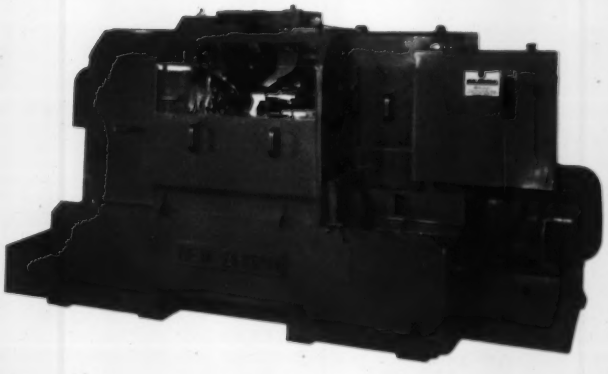
THE NEW BRITAIN MACHINE CO.

Model 62
Automatic Bar
Machine

NB

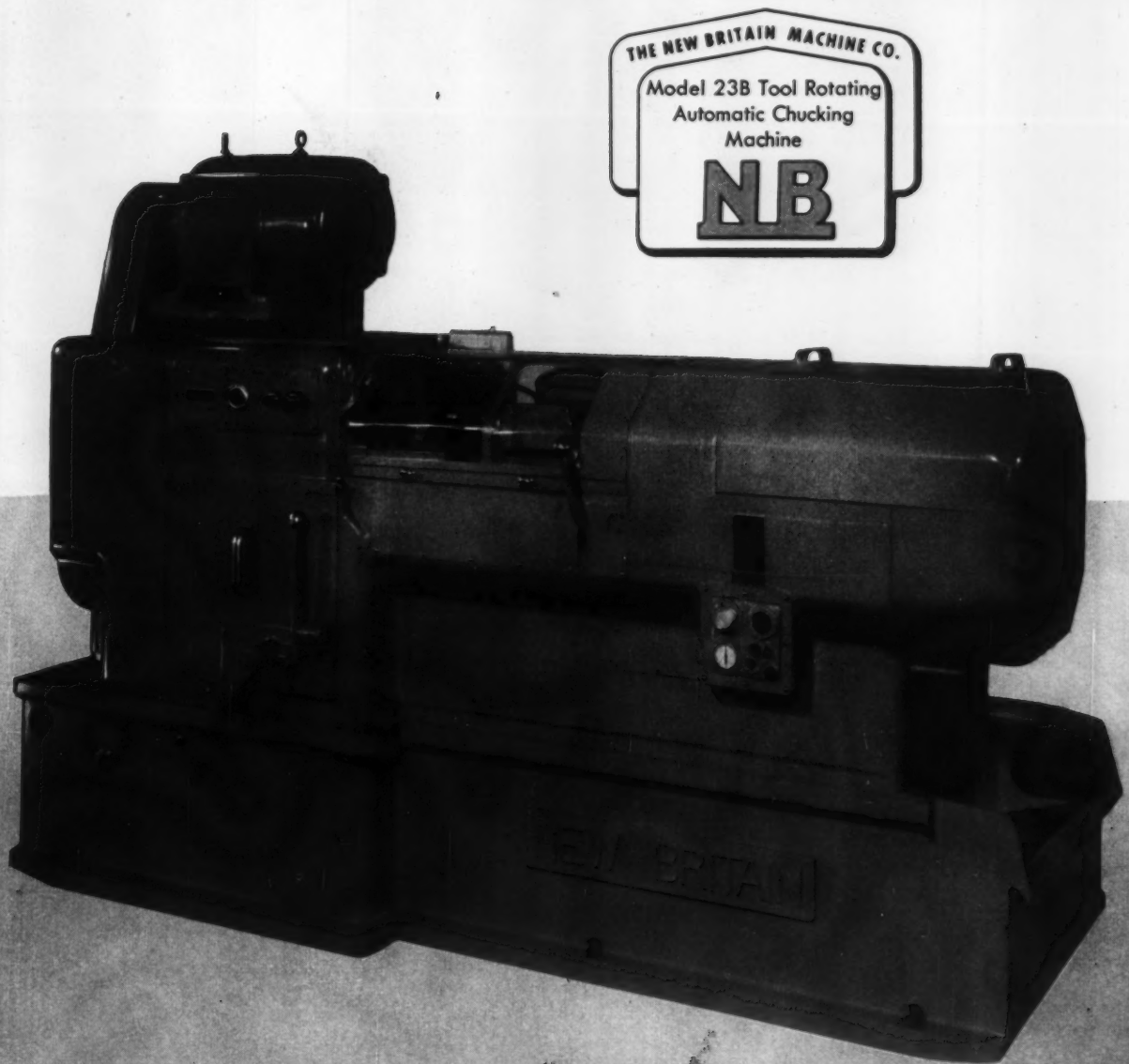
a rugged cross slide in every position

New Britain Models 60 and 61 Automatic Bar Machines are everywhere you turn. The new Model 62 represents new progress in rugged construction and versatility of setup. Your New Britain Representative can show you how to modernize at a profit. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.



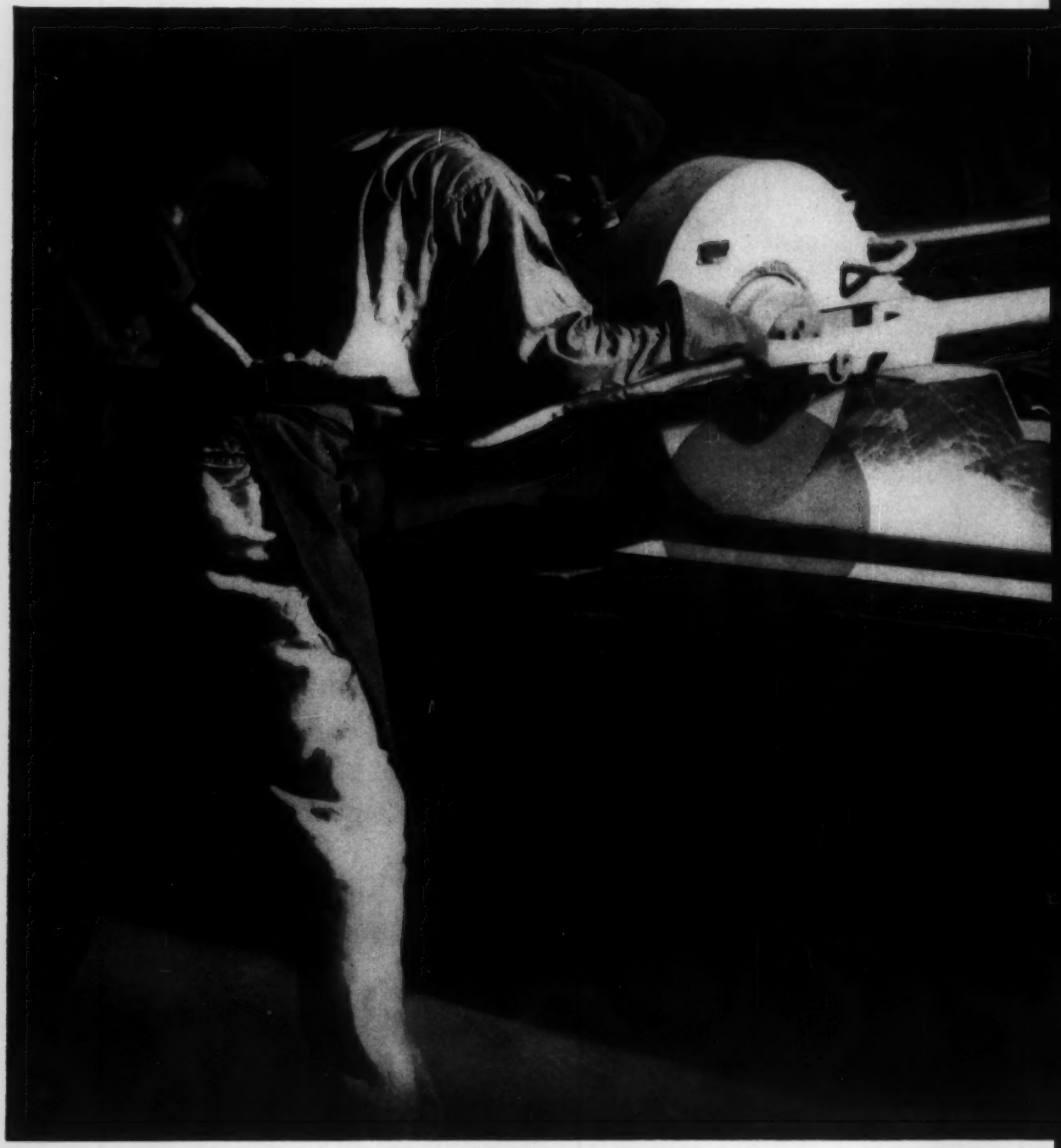
got a job you can't swing?

New Britain tool rotating chuckers are designed for high speed machining of irregularly shaped pieces which cannot be rotated on standard machines, and for second operation bar work. Model 23B has four spindles and five chucks, one position being reserved for loading. It indexes up to 1250 pieces per hour. For any problem involving automatic chuckers New Britain is headquarters. Consult your New Britain representative or write The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.



STEEL MILLS!

Condition alloy steel at



lower cost with Norton

BZZ wheels

Get the "TOUCH of GOLD" in your billet grinding

How do you figure your costs of grinding alloy steel billets, slabs, sheet bars and strips?

In terms of

— cost per ton ground?
— cost per pound of metal removed?
— man-hours per ton ground?

Any way you reckon it, Norton BZZ Wheels will register by far the best score on your cost sheet. After six years of developing and field-testing, these exceptional wheels are making good in a big way.

Here are the benefits they're bringing to mills across the country:

Advantages To Management—Lower cost grinding . . . increased productivity . . . greater safety . . . better finish.

Advantages To Operators—Faster cutting . . . easier handling . . . safer.

Let us prove how Norton BZZ Wheels can bring these same advantages — the sure "Touch of Gold" — to your own conditioning of alloy steel. Your Norton Abrasive Engineer will gladly arrange a test in your mill. Or write direct to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities — listed in your telephone directory, yellow pages, under "Grinding Wheels." *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

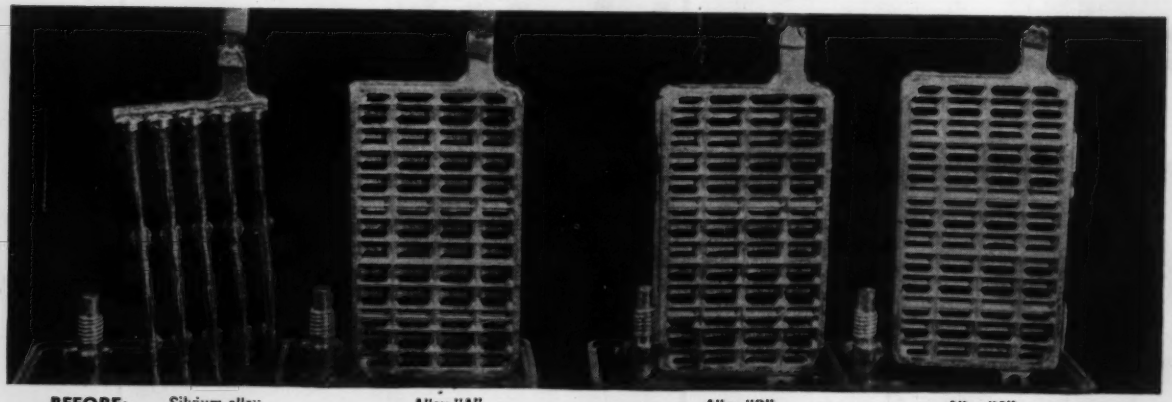
W-1693

NORTON
ABRASIVES

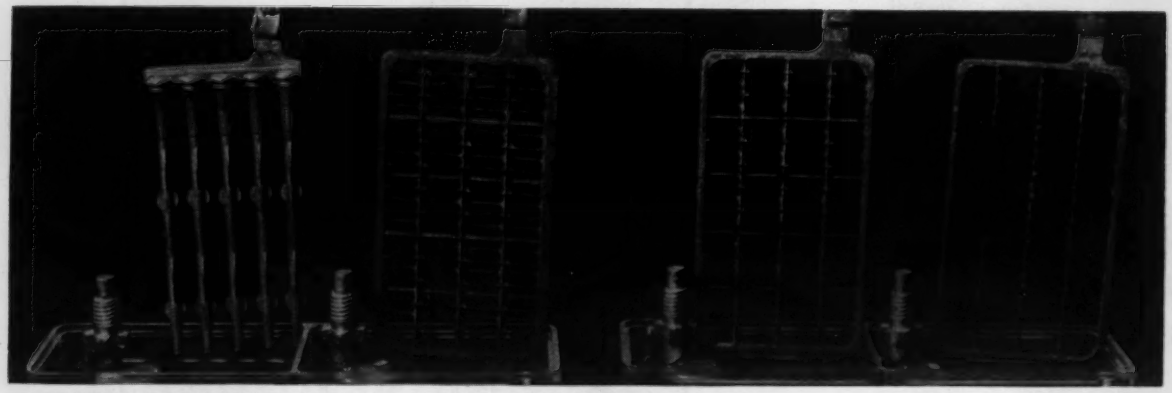
Making better products . . . to make your products better

EXIDE-IRONCLAD BATTERIES

For electric industrial truck operation



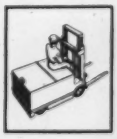
BEFORE: Silvium alloy — Alloy "A" — Alloy "B" — Alloy "C"



AFTER: Note how the Silvium grid resisted corrosion. Compare it with the other alloys.

Corrosion resistant SILVIUM prolongs battery life

BATTERY FOR ELECTRIC INDUSTRIAL TRUCK, Model TH. Fits snugly into space provided on truck. Has tubular construction of positive plates, Silvium grids, "Permanized" negative plates, extra heavy connectors and all other Exide-Ironclad advantages that mean power to spare in heavy duty applications. Write for Bulletin 5161.



Reaching down deep into every Exide-Ironclad Battery are the fingers of Silvium alloy metal which form the grids of the famous Exide-Ironclad positive plates.

Silvium is a special alloy developed by Exide to resist corrosion and thus prolong battery life. For proof, Exide research engineers compared the performance of an Ironclad Silvium grid side by side with ordinary grids of other lead alloys. As the photographs above show, only Silvium came through the test without damaging corrosion—undiminished in size, unimpaired in strength. The other grids showed from moderate to severe corrosion.

Tests have proved that Silvium is not only more resistant to corrosion, but also a better conductor of electricity. Hence it both prolongs battery life and —because there's less internal battery resistance—more readily permits heavy drafts of power.

This special material is only one of the many exclusive features which have made Exide-Ironclad Batteries world famous for high capacity and long life. When you order batteries for heavy duty applications, or the equipment requiring such batteries, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Phila. 2, Pa.

Exide®

BOHN BRASS ROD

Controlled from melt, to mill, to you

Control is the key to greater uniformity in brass rod. That is why Bohn controls begin with the melt itself. The melt number—identifying its exact chemical properties—is marked on each billet. This number follows a given job through every mill operation. And at every operational stage, the physical and metallurgial properties are checked, recorded, rechecked. The result is the greatest possible uniformity—and easier, more efficient machining for you—even with the most exacting specifications.

***FOR PROMPT DELIVERY** of free cutting rod, or special alloys, standard or special shapes, contact your nearest Bohn sales office:* Boston, Chicago, Cleveland, Dayton, Detroit, Indianapolis, Milwaukee, Minneapolis, Moline, New York, Philadelphia, Rochester, St. Louis.

BOHN Aluminum and Brass Corporation • 1400 LAFAYETTE BUILDING • DETROIT 26, MICHIGAN

BRASS ROD • BRASS AND BRONZE INGOTS • EXTRUSIONS • CASTINGS • FORGINGS • PISTONS • BEARINGS • REFRIGERATION AND AIR CONDITIONING PRODUCTS

NEW!

WATERBURY FARREL SLOTTER

"Model 5"

DELIVERS UP TO 51,840 (BURR FREE) BLANKS PER HR....

SLOTS STANDARD & SPECIAL SCREW HEADS, FERROUS OR NON-FERROUS BLANKS #6 TO ¼" DIA., UP TO 2½" LONG, AT VARIABLE SPEEDS FROM 60 TO 864 PER MINUTE.

ONE "Model 5" Outproduces TWO Earlier Type Slotters

The speed and work range of this completely new Waterbury Farrel slotter make it more productive than a *pair* of earlier type slotters which used indexing dials and saw-into-work sequence.

The "Model 5" has long and short run versatility, too. Its simplicity and rapid set up make it economical for short runs while its high speed pays extra dividends on long runs.

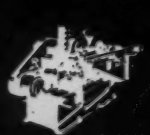
Inexpensive Tooling

The only tooling required is a saw and burr-remover blades made inexpensively from spring steel. One dial, furnished as standard equipment feeds the above range of blank diameters. Special dials can be furnished for other blank diameters.

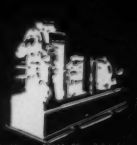
WATERBURY FARREL
Foundry and Machine Company
WATERBURY, CONN.

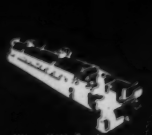
Branch Offices: Chicago • Cleveland • Millburn, N. J.

For further information, write for free bulletin or contact your nearest WF representative, today.


Bolt, Nut & Screw Machinery

Power Presses


Rolling Mill Machinery


Wire Mill Equipment

Sendzimir Mills & Other Special Machinery

WATERBURY FOUNDED 1851 FARREL

COMPARATIVE TESTS on identical new worm gears demonstrate superiority of Sunep Gear Lubricant. Gear on left, using a compounded cylinder oil, shows excessive wear at 70 hours. Gear on right, protected by Sunep, shows minimum wear after running over 200 hours!

HERE'S PROOF SUNEP GEAR LUBRICANTS MINIMIZE WEAR

Sunep Gear Lubricants cut power losses... protect against overloads ...lengthen gear life... reduce maintenance costs and replacements.

During recent tests gear units protected by Sunep Gear Lubricant showed an absolute minimum of wear when run at normal rated capacity. There was no indication of scoring or wear even when run at overloads up to 118%! Power consumption was reduced up to 25%. Damage from shock loads was nil.

In addition to outstanding load-carrying ability, Sunep Gear Lubricants are extremely stable, non-corrosive, prevent rusting, keep gears and bearings clean.

For complete information about how Sunep Gear Lubricants can help give longer life to your worm gear units, see your Sun representative... or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. S-3.

SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

For

LONGER LASTING BOTTOMS

Specify High MgO Permanente 165!

As THE world's highest quality ramming mix for open hearth bottoms, Kaiser's Permanente 165 contains *165 pounds of MgO per cubic foot!*

This unique ramming mix is manufactured by original and patented methods from refractory Periclase grains of 94–96 per cent magnesium oxide. Permanente 165 ceramically bonds itself into a crystalline mass at relatively low temperatures.

The great and growing demand for this superior high MgO ramming material is ample proof that Permanente 165:

LASTS FAR LONGER than other materials.

REQUIRES FEWER REPAIRS on bottoms and banks, thus drastically reducing down-time and repair materials needed.

PERMITS MORE STEEL TONNAGE—and at lower bottom cost!

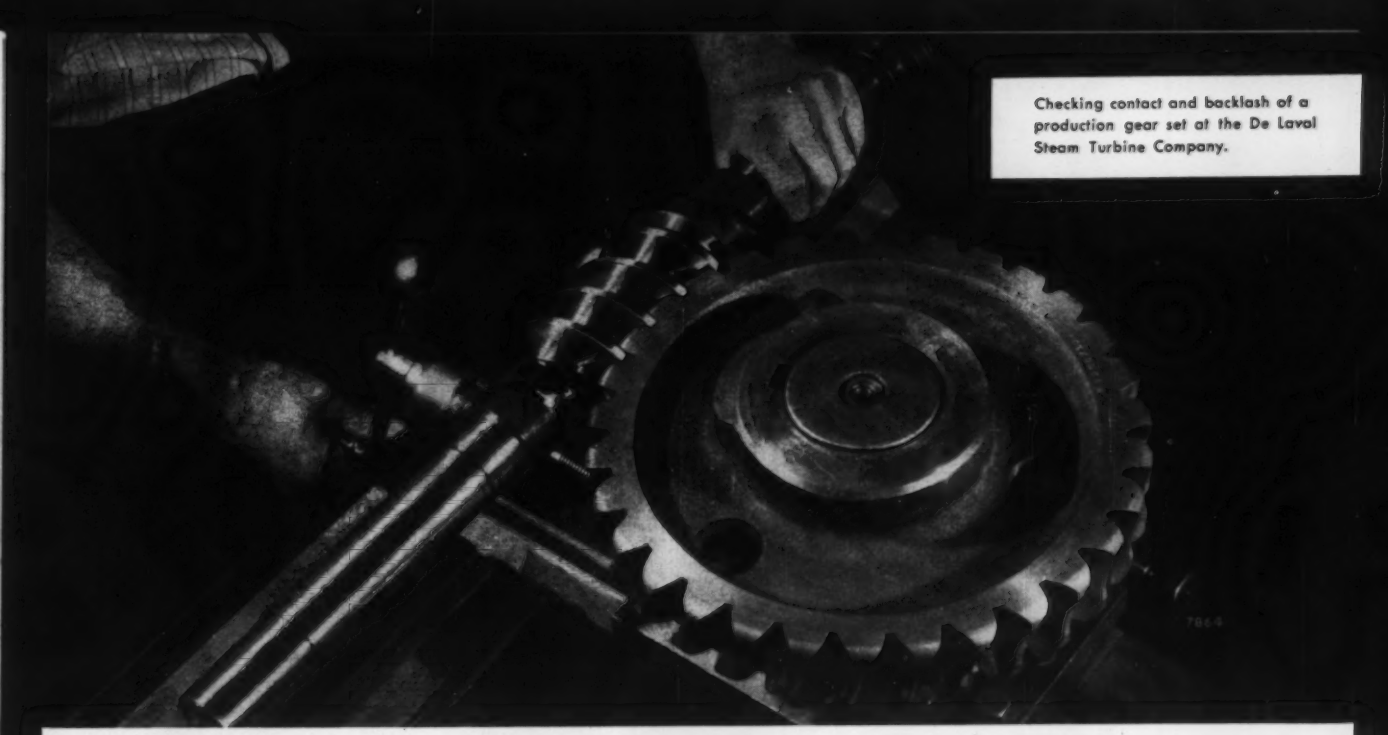
Let your Kaiser Chemicals sales engineer provide you with research, design and installation service to help you obtain more tonnage, improved quality—and lower operating costs.

Kaiser Chemicals Division, *Kaiser Aluminum & Chemical Sales, Inc. Regional Sales Offices: 1924 Broadway,* OAKLAND *12, California . . . 3 Gateway Center,* PITTSBURGH, *Pennsylvania . . . 518 Calumet Building, 5231 Hohman Avenue, Hammond, Indiana* (CHICAGO).

Kaiser Chemicals

Pioneers in Modern Basic Refractories

Refractory Brick and Ramming Materials
Castables & Mortars • Magnesite • Periclase
Deadburned Dolomite



Checking contact and backlash of a production gear set at the De Laval Steam Turbine Company.

How to Save in Selecting Worm Gear Sets

By JAMES E. GUTZWILLER, *Assistant Chief Engineer, Worm Gearing Department*

De Laval Steam Turbine Company

Worm gear sets have four major advantages: compactness, easy maintenance, interchangeable components, and high shock-load capacity. The user can realize maximum benefits from these advantages and reduce costs by acquiring some background information on the characteristics of worm gearing. Here are a few points to consider.

Standard Components. Find out what standard components are available before proceeding with design. De Laval stock parts include worms, gears, bearing housings and end covers. By selecting from these, the user may sharply reduce the cost of the finished gear set.

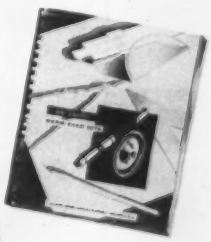
HOBBING MACHINE — Tangential feed gives uniform teeth of precise dimensions. This is accepted as the most satisfactory method for producing close tolerance worm gearing.

The hob, for example, must match the pitch diameter, pitch, lead and tooth form of the worm. Designers who are familiar with standard hobs can design a worm accordingly and save the expense and delay of obtaining a special hob.

A Note on Assembly. The worm, having threads which are continuous in form, is not critical in regard to endwise location. The gear, however, must be precisely positioned in an axial position. Accumulation of tolerances on the dimensions of housings, shafts, bearings and gears makes it impractical, in most cases, to control the location of the gear by accuracy of machining alone.

Shrouding. Heat developed in the gearing will be more freely dissipated through a comparatively open housing. Close shrouding is permissible only when intermittent operation is the rule.

Helpful Manual on Worm Gear Sets



For information on how to select, install and maintain worm gear sets, send for this helpful manual. It contains useful data on gearing and includes examples of specific selection problems with their solutions. Write on your business letterhead to the De Laval Steam Turbine Company, 860 Nottingham Way, Trenton 2, N. J. for Catalog 5000.

Case History No. 34 • AUTOMATIC VALVE

GRAY IRON SAVES THE DIFFERENCE!

This manufacturer had an annoying valve service problem caused by leakage in fabricated assemblies. By converting to Gray Iron castings, he not only solved this service problem, but also effected a 70% saving in production cost.

Conversion to Gray Iron has also resulted in sharply increased sales of the valve, according to the manufacturer.

You, too, can improve product appearance and performance and enjoy cost reductions by switching to Gray Iron. Look at *your* products and see where this time-tested metal can transform present designs into better performing, lower cost units.

For specific technical or business information, write to Gray Iron Founders' Society, Inc., National City—East 6th Bldg., Cleveland 14, Ohio.

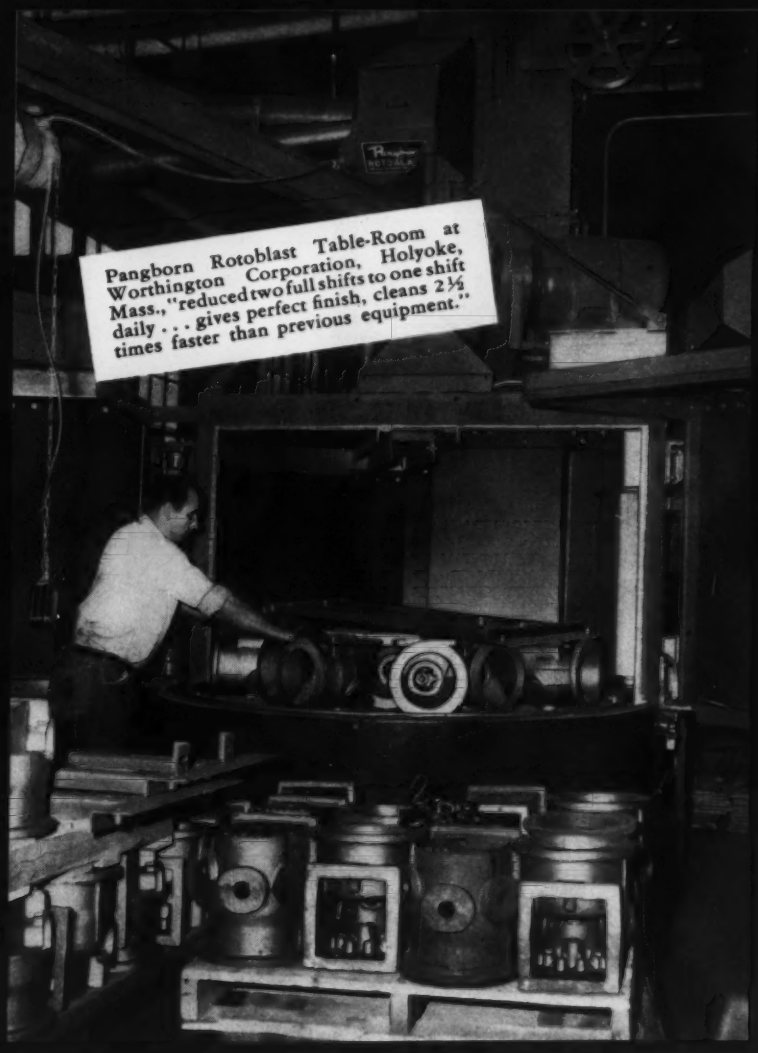
This symbol assures you the most for your casting dollar

Here's why it pays to call in one of the more than 500 leading foundries displaying the Society symbol:

- The most recent technical and business information is available to each member through the Society to help you design better products at lower cost.
- The use of sound cost accounting procedures is recommended and encouraged among Society member foundries, assuring full value for your casting dollar.
- Improved castings result from the advanced techniques and the high sense of responsibility of Society members.

MAKE IT BETTER WITH GRAY IRON

GRAY IRON FOUNDERS' SOCIETY



Pangborn Rotoblast Table-Room at Worthington Corporation, Holyoke, Mass., "reduced two full shifts to one shift daily . . . gives perfect finish, cleans 2½ times faster than previous equipment."

Pangborn Rotoblast® gives "perfect" finish at Worthington Corporation!

And "cleans cleaner than pickling acid" at Brydon Brass!

Rotoblast Blastmaster® Barrel at Brydon Brass Mfg. Co., Toronto, Canada, "cleans cleaner than pickling acid . . . we're enthusiastic and completely endorse the cleaning quality."

Industrial parts today must have a high quality finish for many reasons—production facility, operating efficiency, consumer demand. Pangborn Rotoblast gives such a finish—thoroughly cleaned, uniform—and does it *quickly.* As a result, you get a top-notch cleaning job and greatly increased production with lower operating, labor and reject costs. Write for further details to see what Rotoblast can accomplish for *you.* Send for Bulletin 227 to PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

Visit "Pangborn Institute" at AFS SHOW, ATLANTIC CITY, May 3 to 9

Pangborn

BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

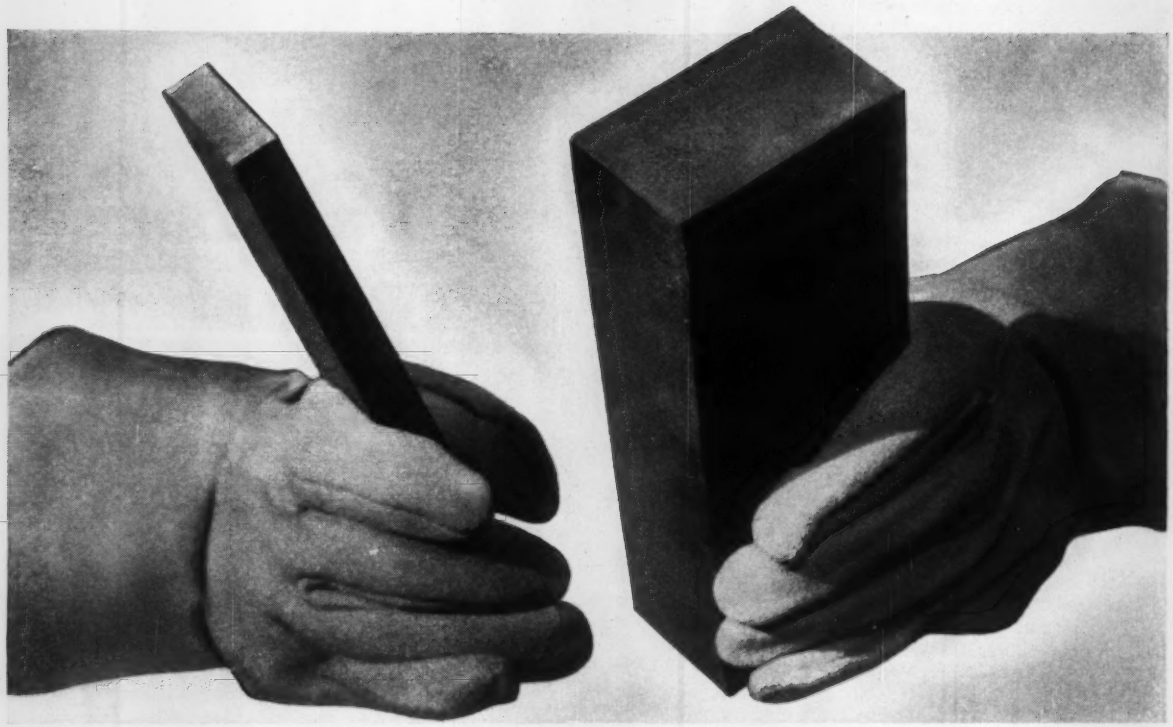
Rotoblast Tables & Table-Rooms

Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Malleabrasive® Shot & Grit

Distributors for Malleabrasive and Try-Steel Abrasives



Which is the ECONOMY SIZE?

3 times stronger than carbon steel, Lukens "T-1" steel slashes equipment weight, reduces costs

The lighter weight, reduced thickness of Lukens "T-1" steel, in comparison to heavier, thicker plates of ordinary carbon steel, makes possible substantial over-all savings in material and fabrication costs for equipment builders. This new all-purpose steel—a unique, low-carbon, quenched and tempered alloy plate steel—has a yield strength three times greater than ordinary carbon steel. It can cut costs by reducing weight and still increase payload and efficiency.

Equipment fabrication is no problem with Lukens "T-1" steel. It is readily welded—often without preheating or stress relieving—and can easily be fabricated, modified or repaired at the field site. Its exceptional toughness and resistance to wear and impact lowers maintenance costs and lengthens equipment life. Additional savings are possible where Lukens' range of steel plate sizes—including the widest and heaviest available anywhere—makes possible the use of wider sizes that require fewer welded seams.

Lukens "T-1" steel is the most recent addition to Lukens' complete line of carbon, alloy and clad steels. Its unusual combination of properties suit it especially to application in pressure vessels, bridges, shipbuilding, construction machinery and general industrial equipment. On problems of design, selection, application and fabricating techniques, Lukens offers full technical assistance. If you would like further information on Lukens "T-1" steel, write for Bulletin 765 on its properties, characteristics and applications. Address: Manager, Marketing Service, 774 Lukens Building, Lukens Steel Company, Coatesville, Pa.

LUKENS "T-1" STEEL

THE NEWEST IN A COMPLETE LINE OF ALLOY STEELS

LUKENS STEEL COMPANY, COATESVILLE, PENNSYLVANIA

G.E. Announces New Induction Heaters

COMPARE THESE PRACTICAL DESIGN FEATURES

DESIGN FEATURES	G.E.	Mfg A	Mfg B	Mfg C	Mfg D	Mfg E	Mfg F
High KVA Oscillator	✓	✓	✓		✓		
Built-in Water-to-air Heat Exchanger	✓						
Readily Accessible For Maintenance	✓		✓		✓	✓	✓
Four Models in Each Rating	✓						
Totally Enclosed Aluminum Oscillator Box	✓		✓		✓	✓	✓
Dust-tight Cabinet Construction	✓					✓	
Industrial-type Oscillator Tubes	✓	✓	✓	✓	✓	✓	✓
Filament Voltage Regulation of ±3%	✓		✓		✓	✓	✓
Water Flow Switch to Protect Oscillator Tube	✓			✓	✓	✓	✓
Three Instruments on Control Panel	✓	✓		✓	✓	✓	✓

Annealing, brazing, soldering, or hardening—whatever the job, G.E.'s new line of electronic induction heaters will help you do it faster, more economically. This new line features four models in each of four ratings (7½-, 15-, 25-, 40-kw) to let you pick the model you need—without wasted investment. Compare (left) this partial list of practical design features with six other leading induction manufacturers, and see why—G.E. gives you MORE KW FOR YOUR HEATING DOLLAR. For more information, contact your nearby G-E Apparatus Sales Representative.

Section E722-3, General Electric Co., Schenectady 5, New York

FREE—New bulletin "New G-E Induction Heaters" GEA-6388.

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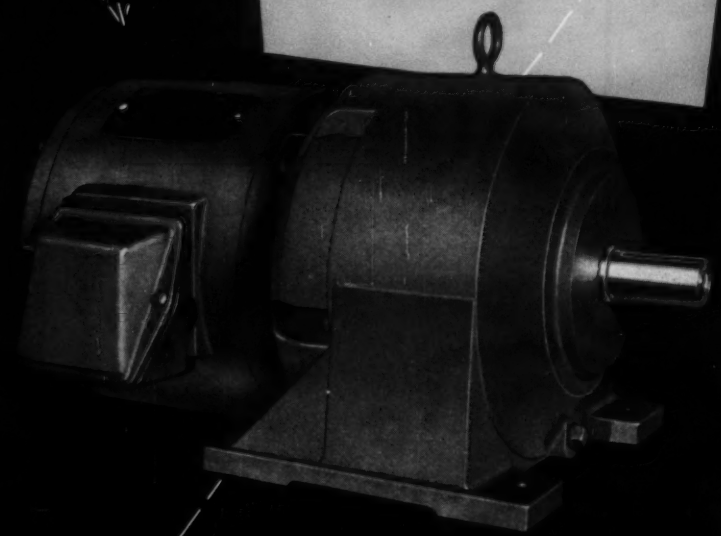
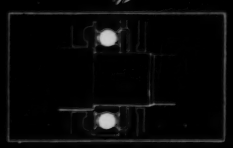
GENERAL ELECTRIC

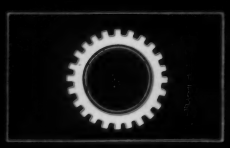
Don't overlook what you can't see



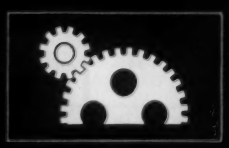
You can't always see what makes a gearmotor outstanding. It's the attention paid to small design details that makes the difference. Here are a few of the details that make the new Reliance Gearmotor stand above the rest.



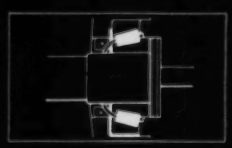
FOOLPROOF METERMATIC motor bearing lubrication and oil bath gear lubrication for long-life protection against wear.



INDUCTION HARDENING of the tough alloy steel gears gives a perfect combination of wear resistance and strength.



SIMPLIFIED GEARING with few moving parts reduces friction losses and lessens chances of breakdown.



THRUST BEARINGS handle heavy overhung loads safely by placing strain on the frame instead of the shafts.

Find out the complete story for yourself—contact your Reliance representative or write for Bulletin E-2408.

E-1508

REDUCE SPEED

RELIANCE ELECTRIC AND ENGINEERING CO.

CLEVELAND 10, OHIO • OFFICES IN PRINCIPAL CITIES

Canadian Division: Welland, Ontario

Tuffy® SLING NEWS

Vol. 1 Published Monthly in Leading American Trade Magazines by Union Wire Rope Corp. No. 5

NEW FERRULE TEAMS UP WITH Tuffy® FABRIC FOR BETTER SLINGS

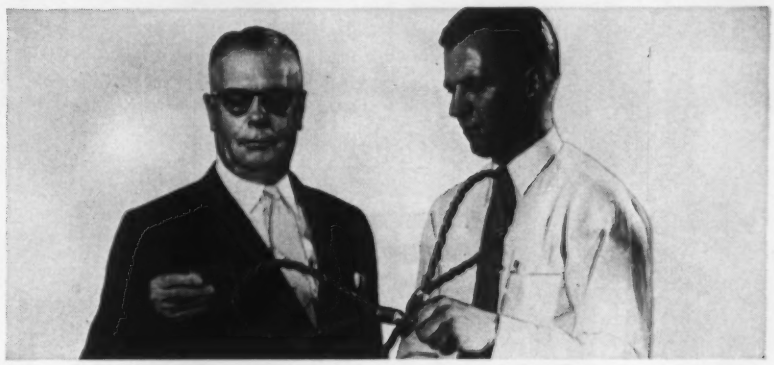
Strength of Machine Braided Fabric Equaled in Eye-Splice

SPEEDS UP SLING WORK

See for yourself at your Tuffy distributor's how this new, steel ferrule on all Tuffy Slings is streamlined with no rough edges to injure hands or catch on loads.

The new ferrule on all Tuffy 9-part machine braided wire fabric slings is the most important development in slings since Tuffy made history by introducing machine braided wire fabric. Here's why:

1. This new ferrule, squeezed around the tucked eye splice of Tuffy Slings, under pressure, creates a force of friction so powerful that a pulled out splice is virtually a thing of the past.
2. Because the ends of the ferrule are swaged flush with the machine braided strands, there are no projections left to snag on loads or injure hands. As a result, handlers can work much faster and with greater safety—doing more in a shorter time—when they're working with flexible, Tuffy Slings.



3. You pay nothing extra. The new Tuffy eye-splice with pressed on metal ferrule gives you a far better Tuffy Sling—but at the same reasonable price.

As always, Tuffy Slings are extra flexible and kink-resistant. It's almost impossible to kink a Tuffy. But if it does kink, you can always straighten it without materially damaging the fabric. Everyone who has used the new all-metal pressed on ferrule agrees that it adds a great deal to the service life of Tuffy machine braided wire fabric slings.

Your Tuffy Distributor Can Save You Money

Tell him what your future requirements in Tuffy Slings and Tuffy Hoist Lines are likely to be. He'll tailor his stock for you to draw against. You'll save the time, space, and cost of maintaining your own inventory.

FACTS ON FERRULE, SLINGS, FITTINGS, IN FREE NEW TUFFY SLING HANDBOOK

This new 60-page Sling Handbook gives you complete information (charts and rated working loads) on a larger line of factory-fitted slings. It tells you how to use versatile Tuffy Slings on dozens of different jobs. It shows you how the new Tuffy metal ferrule is pressed on the eye splice to make Tuffy machine braided wire slings safer and faster to work, and it shows you the most advanced sling fittings available. On top of all this, it contains a brand new engineer's handbook and a valuable rigger's manual.

If you buy, use or specify slings—if you are concerned with shop safety, efficiency, and long service life—you need this fully illustrated, comprehensive Tuffy Sling Handbook. Mail the coupon to us now for your copy of the new edition. No obligation.

union Wire Rope corporation

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand.

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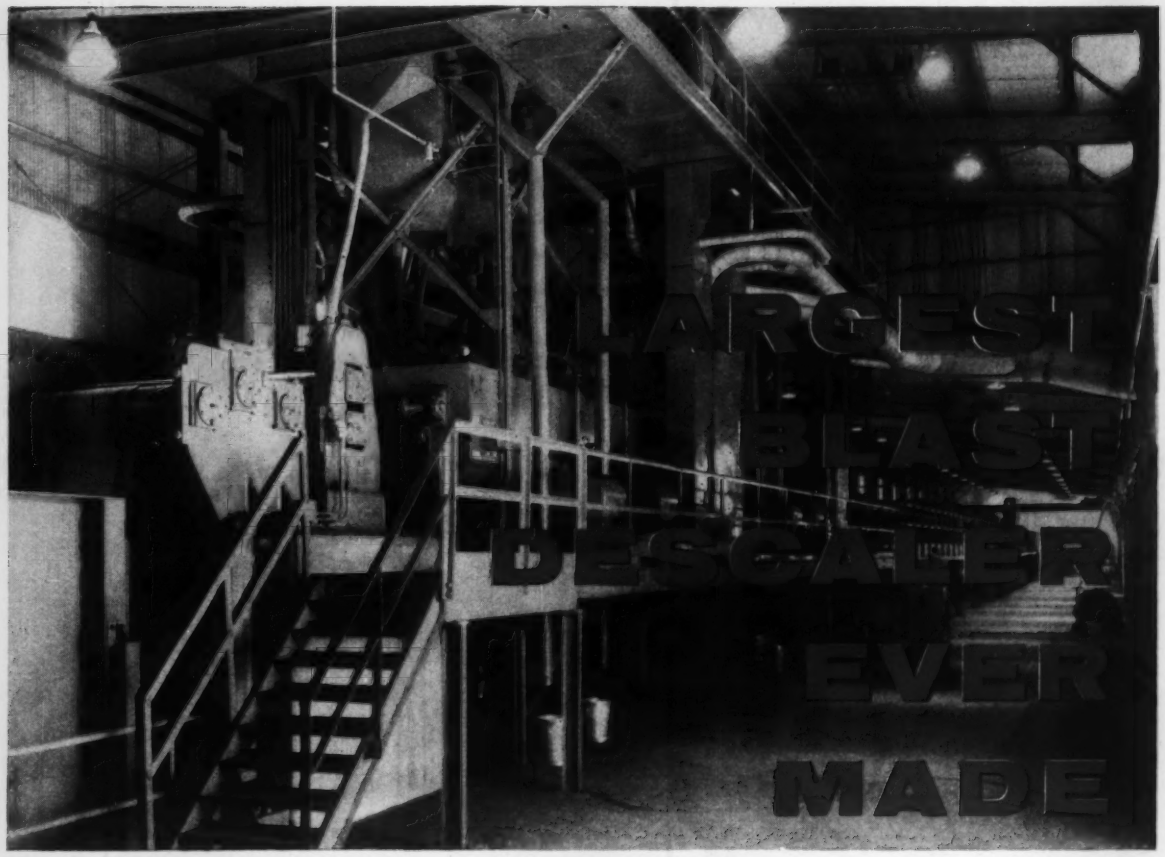
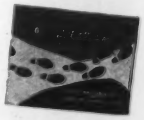


TAKES LESS SPACE THAN PICKLING AT EMPIRE STEEL

descales carbon strip at 250′ per minute; slashes acid tank requirements 75%

A 16-wheel Wheelabrator mechanical descaling machine at Empire Steel Corporation in Mansfield, Ohio, cleans 250′ of carbon strip a minute and has eliminated all pickling except a 13-second immersion in a tank only 60′ long. The Wheelabrator is 66′ long and does cleaning that would require 250′ of tanks for straight pickling. This eliminates 75% of acid requirements and reduces acid disposal problems and tank maintenance. In addition, the matte finish imparted by Wheelabrating enhances the cold working properties of the metal. The high cleaning capacity of Wheelabrator equipment in a relatively small area means savings in floor space for new lines and permits increase in capacity of existing lines in the floor space presently available.

For more information on Wheelabrator blast descaling principles and savings, send today for Bulletin 864.



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CORPORATION
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World's Largest Builders of Airless Blast Equipment

Tool up Quick ...Cut Faster

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CARMET® CARBIDE METAL

STANDARD TOOLS AND BLANKS

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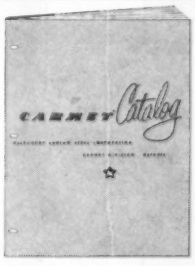
CARMET CATALOG



Just out . . . 32 well-illustrated pages, containing data on all Carmet grades, and on Carmet blanks, tools, die sections, punches, draw die inserts, etc.; also special preforming to order.

● *Write for your copy.*

ADDRESS DEPT. S-751

WSW 4682 B

Need cutting tools in a hurry? Just name the standard styles and carbide grades desired . . . get prompt shipment from a distributor's stock *near* you, or from the Carmet plant.

Our line of carbide "standards" is complete. It covers 90% of all single-point operations. Carmet Standard Tools come ready to use . . . easy to modify for special purposes, by grinding. Style C, illustrated, is designed particularly for conversion into various shapes for numerous applications.

Other standard Carmet styles also are immediately available from local stocks.

Order Carmet Tools and Blanks for better, faster, cheaper cutting. There is a grade to take care of every need. Write the *Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Avenues, Detroit 20, Michigan.*

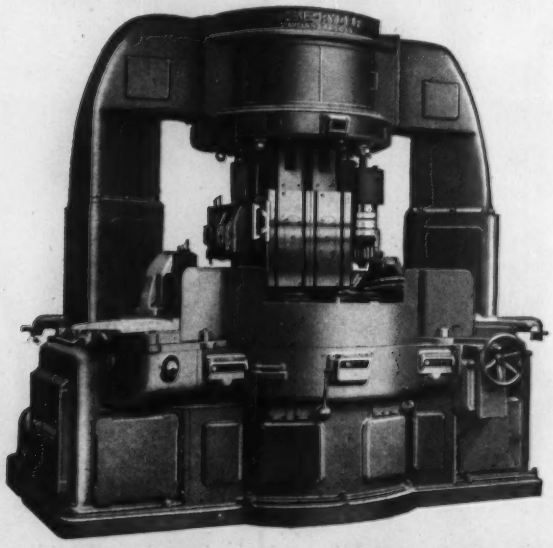
For ALL your CARBIDE needs, call

Allegheny Ludlum

AL® FINE TOOL STEELS SINCE 1854

14" ACME

8-SPINDLE VERTICAL HYDRAULIC



OFFERS MORE

of what you need in a Vertical Chucker

- ★ Sturdy arch frame and massive base construction provides rigid support for top housing and vertical toolslide column.
- ★ Four independently-operated cross slides.
- ★ Feed control of all toolslides by positive cam control.
- ★ Eight vertical toolslides for end-working tools and attachments.
- ★ Wide range of feeds and spindle speeds, with 3-speed selectivity at each work station.
- ★ Operating controls conveniently located at front and rear of machine.

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Introduced by

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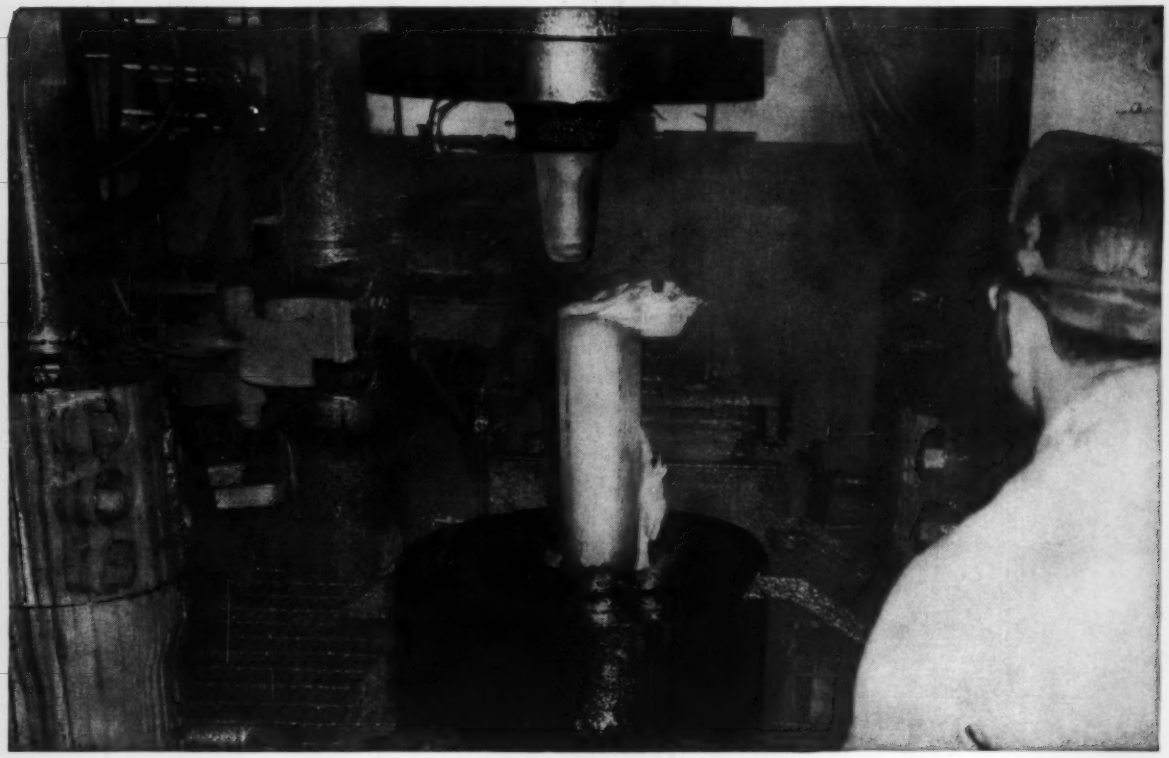
also built in 6-spindle, 17-inch capacity

in response to today's **NEED** *for* **SPEED**



Die Pot Life Increased 350 Per Cent

A deposit of HASTELLOY alloy C hard-facing rod has more than tripled the service life of the die pots used in this slugging and piercing operation. The hard-faced parts are exposed to severe impact and abrasion at high temperatures. Press tonnages required to perform the operation have been reduced from 30 to 50 per cent since the pots have been faced with HASTELLOY alloy C. This rather unusual plus value is due to the low friction characteristics of this nickel-base alloy.

Resists Chipping and Spalling

HASTELLOY alloy C is a tough, machinable, hard-facing alloy that can be applied to all common die steels. It has high tensile strength, good ductility and excellent resistance to chipping and spalling. It can be applied by the metallic-arc process, flows smoothly, and produces sound deposits. No special heat-treating or cooling procedures are needed.

No Grinding or Peening

When deposited, HASTELLOY alloy C has a hardness of 210 Brinell, and can be machined easily by ordinary die-sinking tools. Then the deposit work hardens, in service, to about 375 Brinell without deformation. Its work-hardening characteristics eliminate the necessity for peening the deposit to obtain maximum wear-resistance.

For information on procedures for applying and for available sizes and prices, write for the booklet "HASTELLOY Alloy C—A Machinable Hard-Facing Alloy."

"Haynes" and "Hastelloy" are registered trade-marks of Union Carbide and Carbon Corporation.

HAYNES TRADE-MARK ALLOYS

HAYNES STELLITE COMPANY

A Division of Union Carbide and Carbon Corporation

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World's strongest TAPE?

Even 468 lbs. of wrestlers can't break it! "SCOTCH" Brand Filament Tape is amazingly strong, super shock-resistant. Thousands of filaments imbedded in the pressure-sensitive adhesive give it up to 500 lbs. tensile strength per inch of width. Four colors: Red, Blue, Black, White, and Transparent. Ask your tape distributor for the complete story, or write us direct. Always specify "SCOTCH" Brand, the *quality* tape . . . and stick with it!

FILAMENT TAPE . . . *one of more than 300 Pressure-Sensitive Tapes for industry trademarked . . .*

REG. U.S. PAT. OFF.

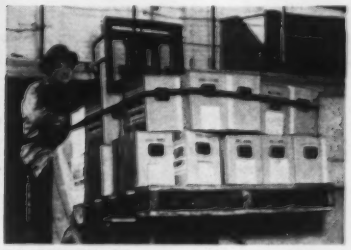
SCOTCH
BRAND

See you at **booth 560, National Packaging Exposition,** Atlantic City, April 9-12

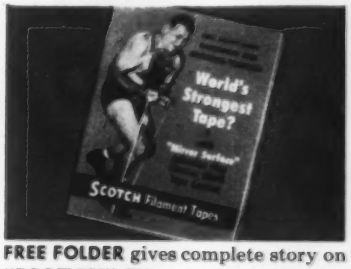
Look what you can do with it!

REINFORCE heavy shipping containers with strips of "SCOTCH" Brand Filament Tape. Tape won't cut cartons; won't loosen; is easily disposed of.

BUNDLE wood strips, metal pipe, conduit, other hard-to-handle long stock. "Mirror surface" adhesive of "SCOTCH" Filament Tape puts all the strength to work . . . holds securely.



PALLETIZE shipments for easier warehouse handling, storage, and shipment. Wrap of "SCOTCH" Filament Tape around top layer prevents load shifting or slipping.



FREE FOLDER gives complete story on "SCOTCH" Filament Tape; how to use it for heavy-duty packaging and materials handling. Write on your letterhead to 3M Co., Dept. GK-36.

The term "SCOTCH" is a registered trademark of Minnesota Mining and Manufacturing Company, St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario. © 3M Co., 1956.

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from the specialty steels you use?

Are you sure you're getting the extra benefits that will improve your production and products in working with specialty steels?

Whether it involves tool and diemaking . . . heat treating . . . working with stainless steels . . . or the use of alloy steels . . . are you missing the profits from relying on Carpenter's *local* specialized warehouse service?

Heading this service to you is your Carpenter Representative. His wide experience can be applied to help you improve, speed or simplify any job involving specialty steels.

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You get an important "extra" when you use Carpenter Specialty Steels. You get the assurance of Carpenter quality supported by the mill's direct responsibility to help you make the most of it.

Take your upward step now. Call your Carpenter Mill-Branch Warehouse, Office or Distributor and see how much more *specialized* service can mean to you.
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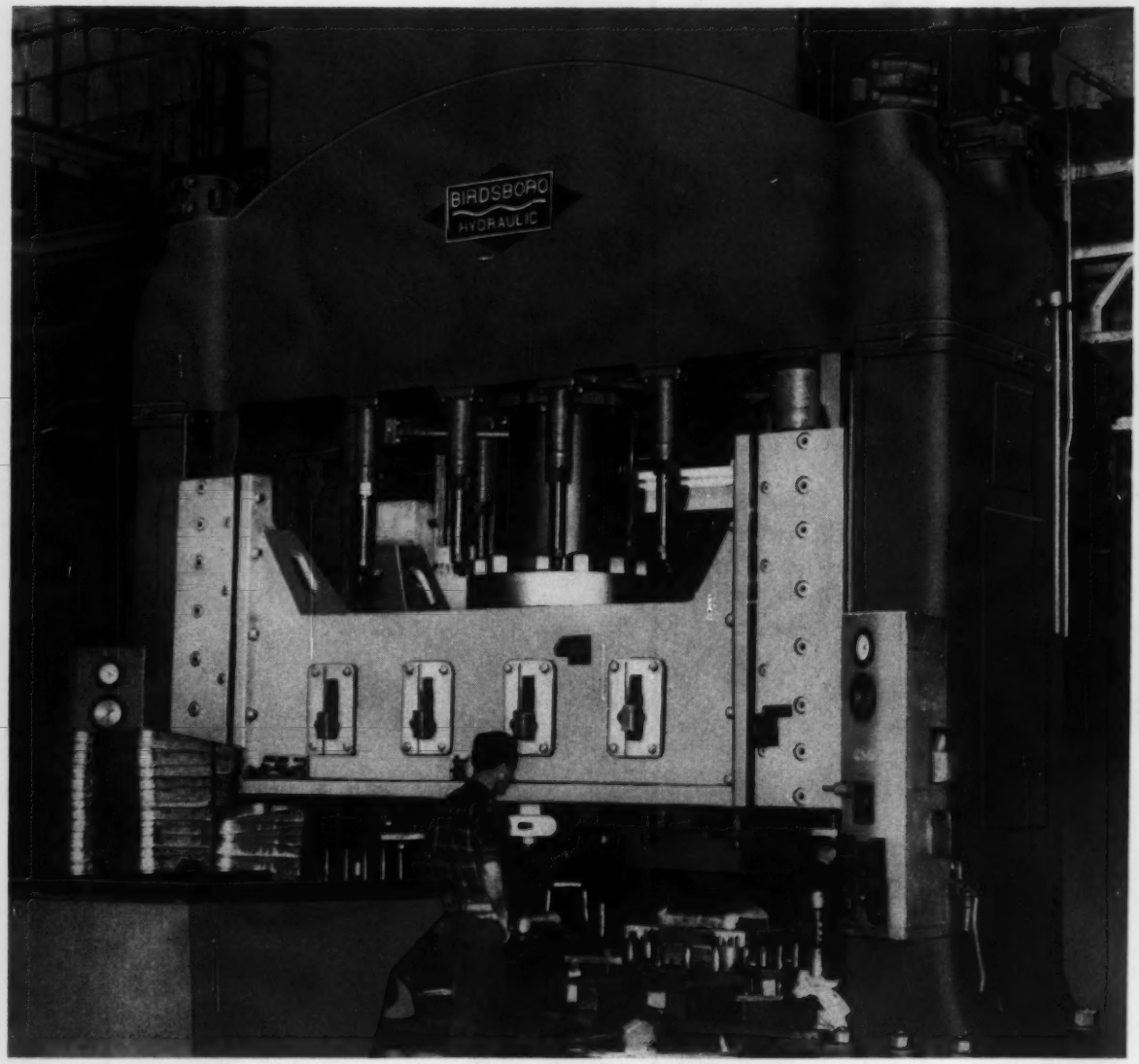
P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada



Here's Hydraulic Press speed, flexibility and accuracy to help you protect profit margins in sheet metal fabrication

Designers and Builders of:

STEEL MILL MACHINERY
HYDRAULIC PRESSES
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SPECIAL MACHINERY
STEEL CASTINGS
Weldments "CAST-WELD" Design
ROLLS: Steel, Alloy Iron, Alloy Steel

● Through BIRSDBORO advanced engineering, large sheet metal stampings can now be turned out faster to close tolerances by this single action, deep draw Hydraulic Press. Design features allow quick changing of dies for more flexible operation.

The press is of the housing and shrunk tie rod type with hydro-pneumatic cushion of 180-ton capacity in the bed. The main ram capacity is 600 tons and the working area 144″ left to right, 60″ front to back, and 60″ daylight opening.

When you're thinking about more profitable operation, call BIRDSBORO in to check over your problems. We'll come up with the specific press recommendations to meet your requirements.

NP-25-56

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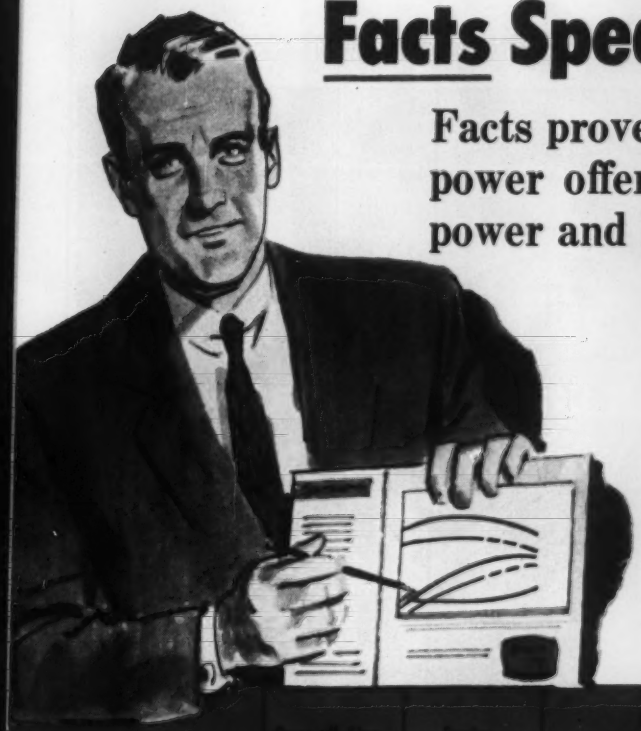
BIRDSBORO STEEL FOUNDRY & MACHINE CO., BIRDSBORO, PENNA. Offices in Birdsboro, Pa. and Pittsburgh, Pa.

Facts Speak for Themselves



Facts prove Chrysler modern V-8 industrial power offers greater adaptability, greater power and higher mechanical efficiency

Size, speed range, horsepower, torque and efficiency . . . these are the most important considerations in selecting power for any equipment. Like every component part, the engine must be judged on the facts.

The Chrysler Industrial Model Ind. 56 V-8 Engine and a competitive engine of virtually the same piston displacement, permit a fair comparison and serve as a good example of the superior performance you may expect from Chrysler Pedigreed Power.

	Over-all Size—Power Unit	Engine Speed Range	Horsepower Available Throughout Speed Range	Torque Available Throughout Speed Range	Piston Speed at 3000 RPM
Chrysler Ind. 56 V-8 Industrial Engine—331 cubic inch displacement	34¼" width 49⅜" length 45½" height	800 to 3000 continuous rpm	92 h.p. at 1600 rpm 116 h.p. at 2000 rpm 138 h.p. at 2400 rpm	302 lb/ft at 1600 rpm 306 lb/ft at 2000 rpm 303 lb/ft at 2400 rpm	1210 feet per minute
Competitive Engine—330 cubic inch displacement	27⅞" width 51$^{13}/_{32}$" length 46$^{13}/_{14}$" height	600 to 2400 continuous rpm	76 h.p. at 1600 rpm 91 h.p. at 2000 rpm 104 h.p. at 2400 rpm	248 lb/ft at 1600 rpm 240 lb/ft at 2000 rpm 230 lb/ft at 2400 rpm	1450 feet per minute
Chrysler Advantage	**less length and height**	**22% greater speed range**	**21% greater h.p. at 1600 rpm 28% greater h.p. at 2000 rpm 32% greater h.p. at 2400 rpm**	**21% greater torque at 1600 rpm 28% greater torque at 2000 rpm 32% greater torque at 2400 rpm**	**16.5% less piston speed at any comparable engine speed**

The Chrysler Ind. 56 V-8 Engine offers greater power, greater flexibility of operation, higher mechanical efficiency, and smaller over-all size. These advantages—*plus* an appreciable savings in the lower initial cost of Chrysler Industrial V-8 Engines—add up to power you can't beat.

All Chrysler Industrial Engines—230 to 413 cubic inch displacement—offer money-saving, money-making advantages. Each can be equipped for use with gasoline, natural or propane fuels. A Chrysler Industrial Engine Dealer will be glad to help you. Find him in the yellow pages of your phone book, or write direct for detailed information: **Dept. 53, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.**

Chrysler Ind. 56 Engine—
331 cubic inch displacement.

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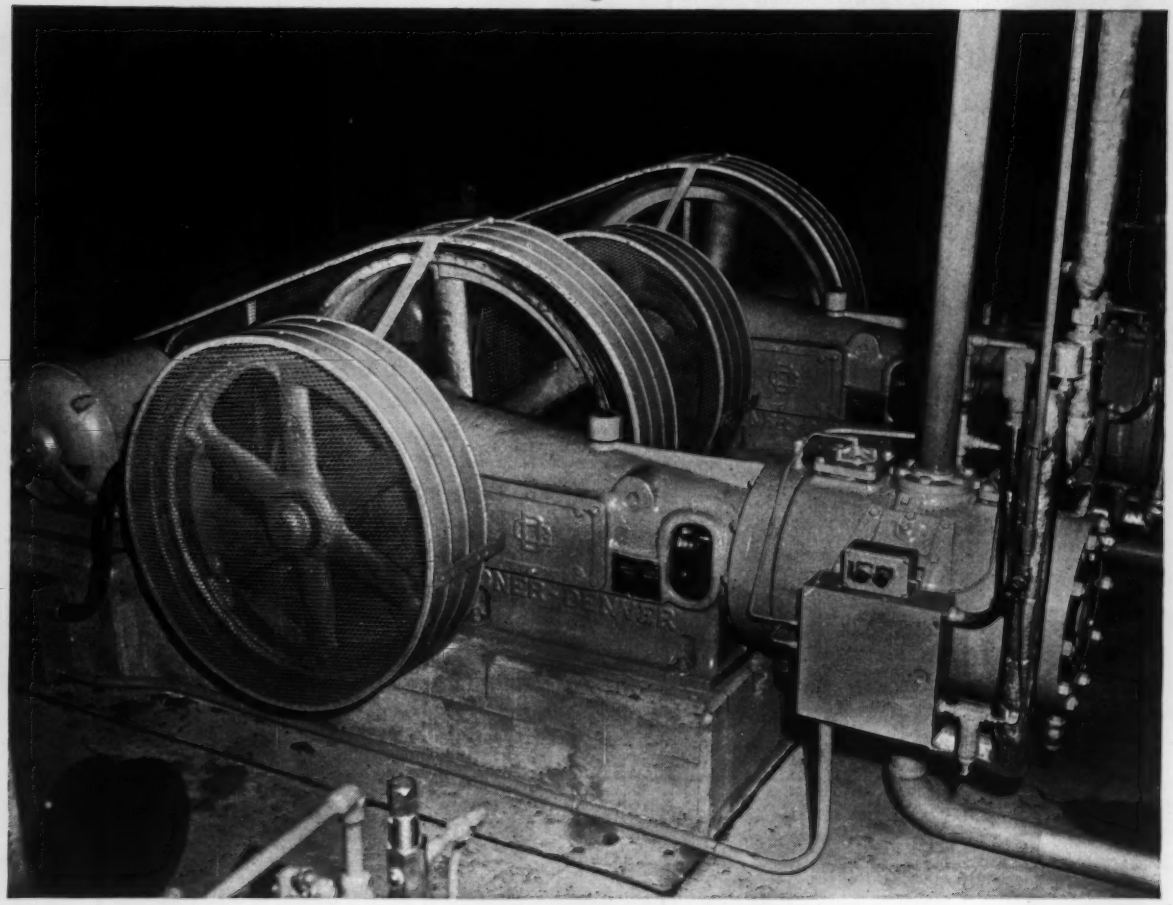
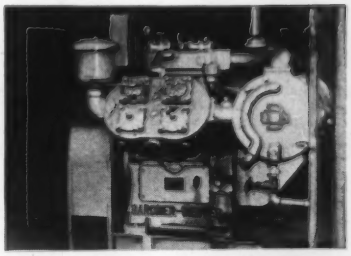
Gardner-Denver . . . Serving the World's Basic Industries



Built for the 168-hour week . . . Gardner-Denver RX Compressors

That's *continuous* service . . . and it goes on year after year in all sorts of plants where Gardner-Denver RX's occupy the compressor room. Bearings, valves and other moving parts are engineered to keep on the go . . . seldom require more than brief inspection halts. Bulletin HAC-40 gives details on RX models from 89 to 1292 cfm, for pressures from 15 to 150 psi. Write today.



Another popular industrial compressor . . . the compact, efficient Gardner-Denver WB. 142 to 1150 cfm.

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THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois

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Remarkably quick, easy assembly and welding of the five .209" gage formed parts that comprise a modern compressor housing is possible because each part is precision formed to extremely exacting dimensions. Additional machining is not necessary. Each part is finished, ready for final assembly, as it comes off By-Products' new high speed press line.

Now—fast stamping to close tolerances!

WHAT CAN OUR NEW PRESS LINE DO FOR YOU?

■ By-Products Steel Co.'s modern new high speed press line adds light gage pressing equipment to its already extensive heavy plate shaping facilities. The line will satisfy manufacturers who need precision formed parts from 16-gage material well into heavier plate thicknesses. And dependability is assured by the combination of the very latest equipment and skilled craftsmanship.

We've made the investment in equipment and manpower. You pick up the benefits in lower overhead...fewer production steps in your shop... reduced freight costs...virtually no scrap loss...lower production costs.

Get the facts! Write, outlining your interests, to Manager, Marketing Service, 832 Lukens Building, Coatesville, Pennsylvania.

■ PRESS LINE UNITS

1. 900 Ton Hydraulic Press
2. 600 Ton Mechanical Press
3. 150 Ton Punching Press
4. 45 Ton Punching Press
5. 22 Ton Punching Press
6. Trimming Press
7. Annealing Furnace
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Units are linked by reversible conveyors for fast, economical production.

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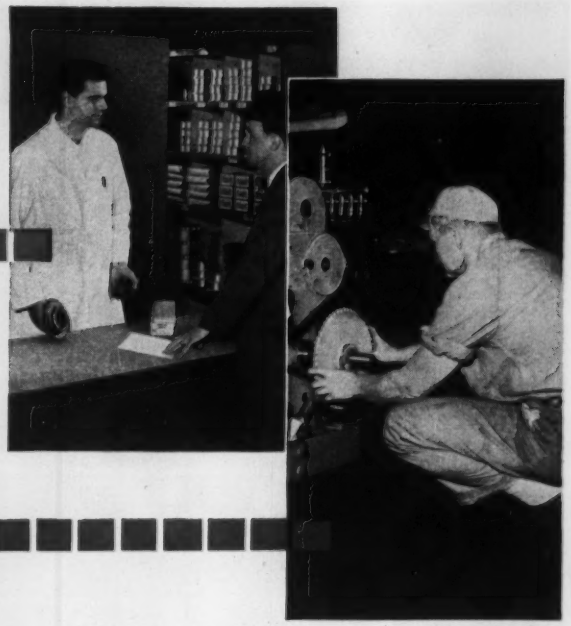
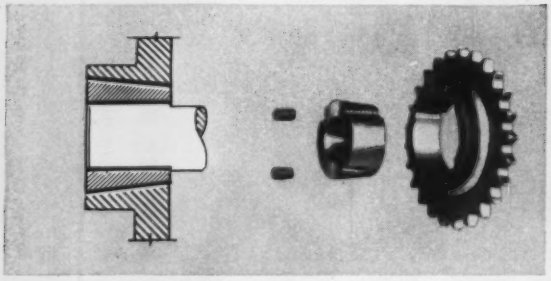
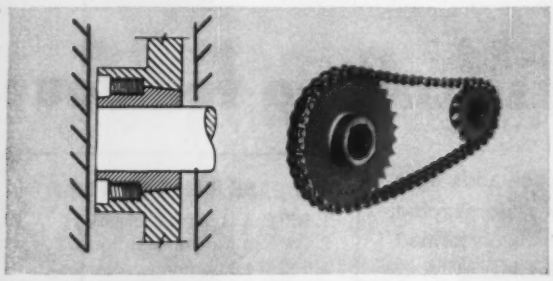
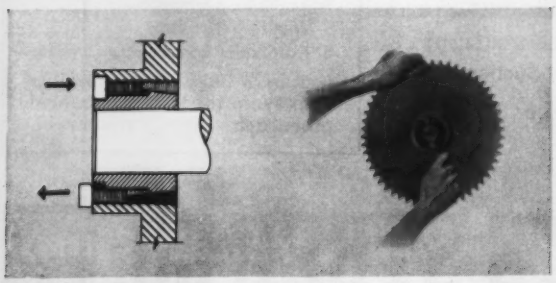




FULL BEARING . . . POSITIVE GRIP. Contact extends the entire length between bushing and shaft, sprocket and bushing. Uniform compression on shaft provided by tapered construction.



SAFE AND COMPACT. Flush mounting requires minimum shaft space and bushing requires no more length than sprocket hub. No projecting flanges or bolts—all cap screws are fully recessed.



EASY TO INSTALL AND REMOVE. Setscrews force and hold bushing in tapered bore of sprocket, clamp it tightly onto shaft. Turning setscrew in removal hole quickly releases bushing.

LINK-BELT roller chain taper lock sprockets require no reboring or other machining

HERE's the simplest, most economical method of installing roller chain sprockets. Link-Belt roller chain taper lock sprockets are available for immediate delivery in every industrial area, in sizes from ½ to 2-in. pitch. Bushings are stocked in bore increments of 1/16 in. for shaft sizes from ½ to 4-in. diameters. No delay for sprockets to be rebored.

Teeth are precision cut in conformance with ASA standards, accurately spaced for smooth chain action. Uniform, true tooth surfaces provide full contact with chain rollers, assuring maximum operating life.

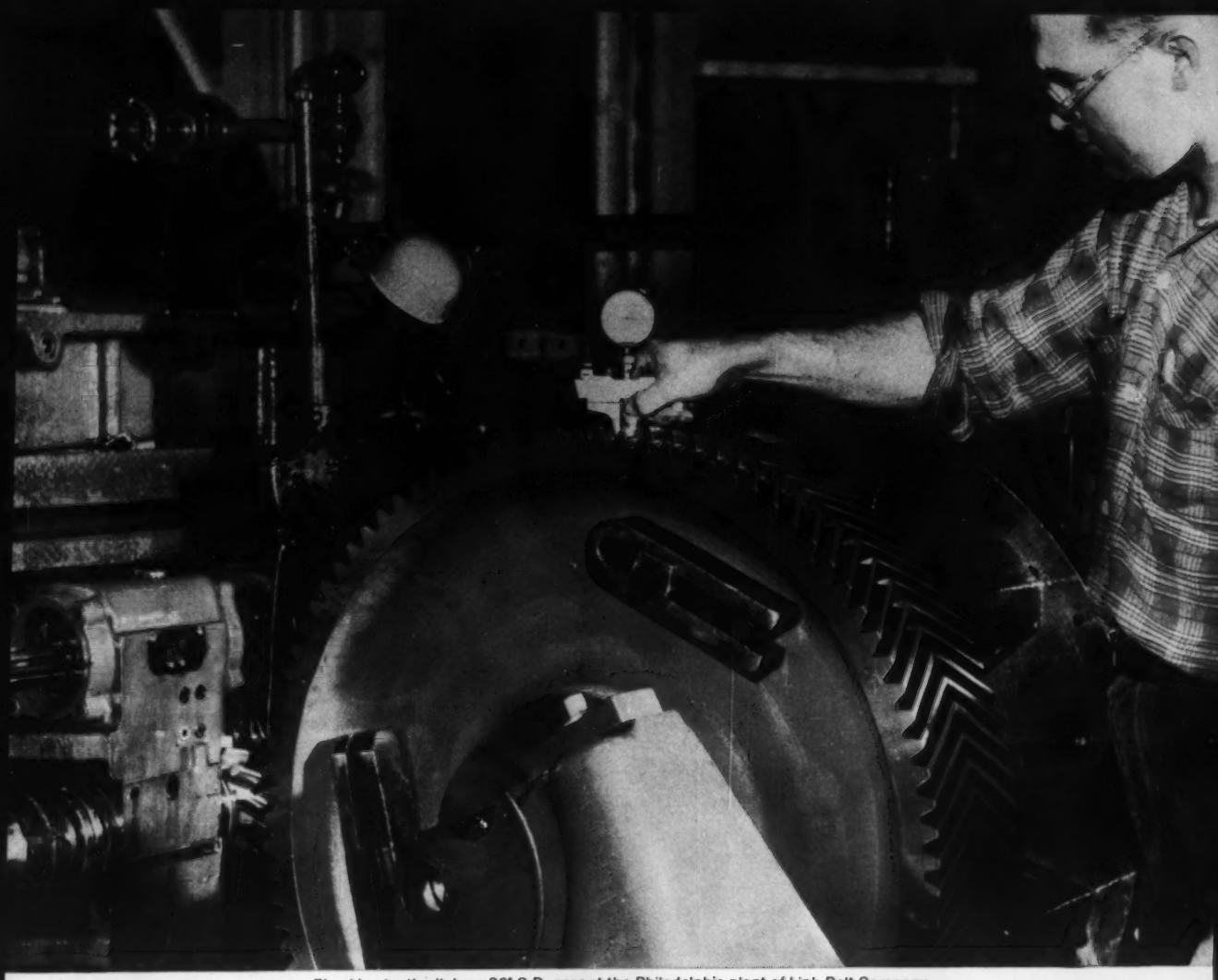
Your source is the Link-Belt factory branch store or authorized stock-carrying distributor. Be sure to ask for new Book 2649 listing all available stock sizes.

LINK-BELT

13,947

ROLLER CHAIN AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.



Checking teeth pitch on 32" O.D. gear at the Philadelphia plant of Link-Belt Company.

speed up machining, extend cutter life with Standard Steel forged gear blanks

By switching to Standard Steel forged blanks for the helical and herringbone gears used in their enclosed drive units, the Philadelphia plant of Link-Belt Company has speeded up machining time and lengthened cutter life substantially. That's because:

- Dimensional tolerances are closer, so all gear blanks of the same size can be machined on a single setup.
- Standard Steel forged blanks have no blow holes, porosity or non-metallic inclusions, so finish turning, facing, boring and hobbing can be done faster.
- High speed cutters last much longer because these forgings have a more uniform internal structure.

Link-Belt's experience in reducing costs is typical of hundreds of other manufacturers. When you specify Standard Steel forgings, you get a product that is quality-controlled from start to finish. We produce our own acid open hearth steel, heat treating and tempering it carefully. Finished forgings are carefully inspected and checked to assure meeting customer specifications.

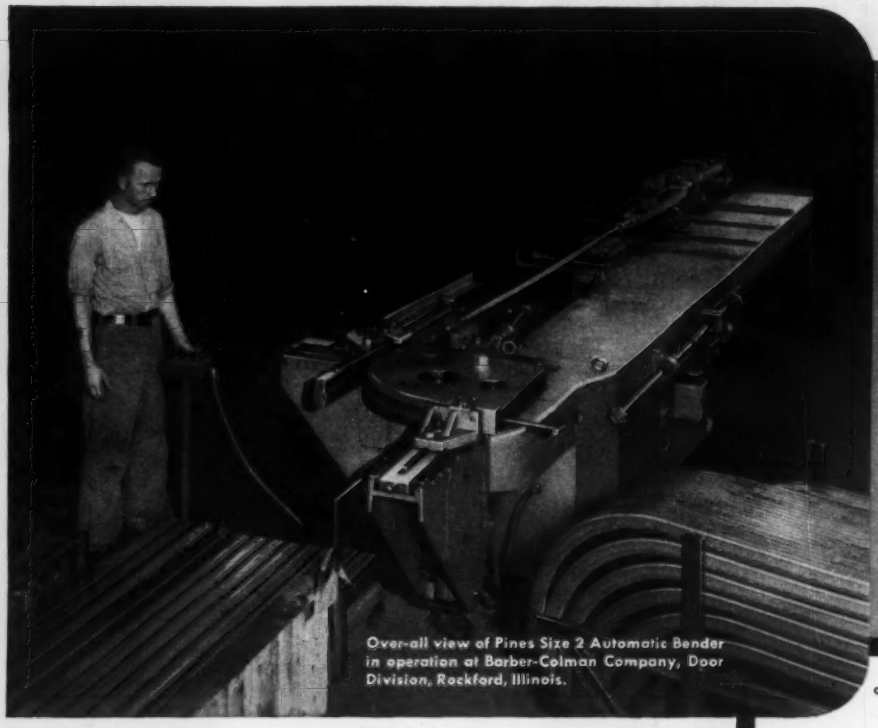
In addition to gear blanks, Standard Steel can furnish you with rings, flanges, shafts, wheels and special shapes—and furnish them *fast*. Next time you need forgings, get our quotation first. For a copy of our new bulletin, write us at Burnham, Pennsylvania.

BALDWIN · BLH · LIMA-HAMILTON

STANDARD STEEL WORKS DIVISION

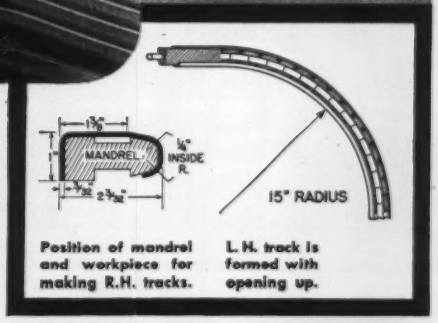
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Eddystone • Lima Electronics & Instrumentation • Hamilton • Pelton • Loewy-Hydropress • Madsen



Over-all view of Pines Size 2 Automatic Bender in operation at Barber-Colman Company, Door Division, Rockford, Illinois.

Steel Channel Costs Cut 15% AT BARBER-COLMAN CO.



Position of mandrel and workpiece for making R.H. tracks.

L.H. track is formed with opening up.

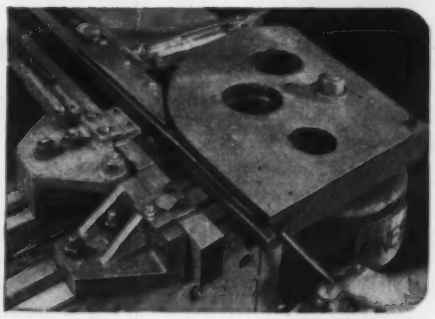
PINES AUTOMATIC BENDER

BOTH L.H. AND R.H. BENDS PRODUCED WITH SAME TOOLING

● Here's another outstanding example of how production bending the "Pines-Way" cuts costs . . . this time for Barber-Colman Company, leading manufacturer of top quality commercial and residential garage doors. By roll shaping door channels from flat stock, then cold bending in a Pines Size 2 Machine, costs have been reduced from 15% to 20%. Formerly, finished channels purchased in lots of 1,000 required extra storage space and a considerable inventory investment to meet the increased demand for "BARCOL" overhead doors. Today, the channels are easily produced as they are needed, which cuts inventory costs, reduces storage and handling problems, and improves delivery.

Smooth, Neat Bends Produced at Production Speeds

As illustrated, 90° bends are formed in HR 13-gauge (.094) steel channels on an inside radius of 15". Of special interest also is that both left and right-hand channels are formed with the same tooling. Smooth, neat bends are produced at production speeds without wrinkling or distorting. As shown in drawing, R.H. tracks are produced with opening down, and L.H. tracks with opening up, which eliminates swing of 8-foot leg. Change in angle specifications are met by the simple angle-of-bend settings on the machine. Setup and operation of machine is handled by semi-skilled machinists.



● Closeup of tooling used for making 90° bend for right-hand track. Flexible mandrel, inserted in channel, insures smooth, wrinkle-free bends. Bending arm speed is 6.0 r.p.m.

Write FOR MORE DATA ON LATEST COST-CUTTING APPLICATIONS . . .

If you would like up-to-date case-study data on production bending applied to steel channels, rods, extrusions, pipe or tubing jobs, write for free copies of "Pines News". Or ask for a Pines engineer to call and assist you with any tooling or production problem.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

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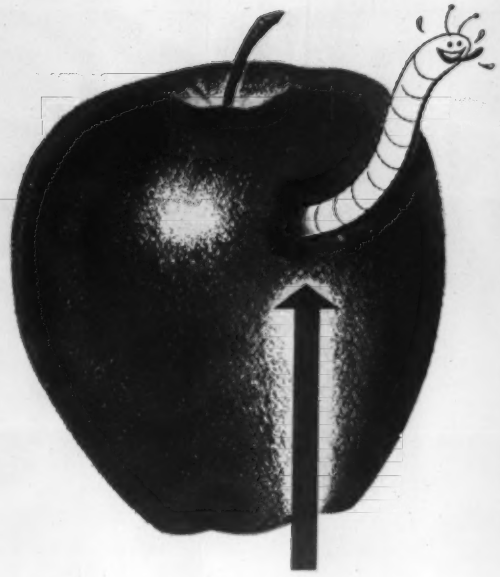
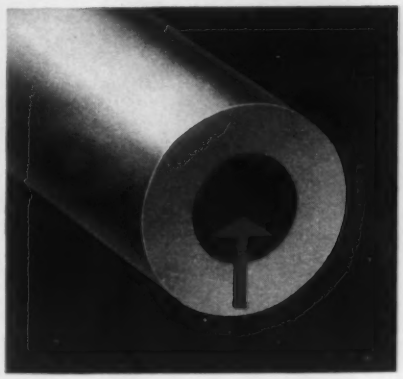
PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY



a hole here makes waste...



a hole here saves waste

Crucible Hollow Tool Steels save waste — time and money — whenever you need ring-shaped parts or tools with a center hole. For the hole is in the piece when you get it! You eliminate drilling, boring, rough-facing operations — save machine capacity for productive work.

And you can get Crucible Hollow Tool Steels in *any* of our famous tool steel grades . . . in bar lengths or saw cut to your individual requirements. They are made in practically any combination of O.D. and I.D. sizes. What's more, delivery is *immediate* with Crucible's popular KETOS oil-hardening, SANDERSON water-hardening, AIRDI 150 high-carbon high-chromium, AIRKOOL air-hardening, and NU DIE V hot work tool steel grades from warehouse stocks.

Next time you have an application with a center hole, let your Crucible representative show you how these hollow tool steel bars can save you money and time. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

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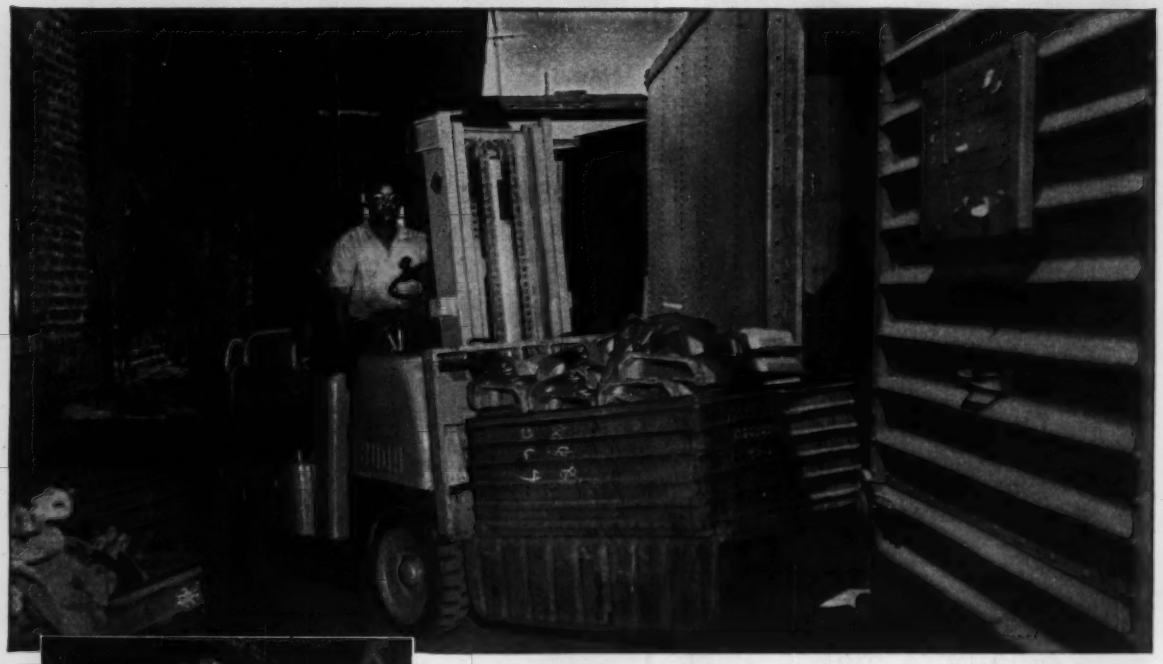
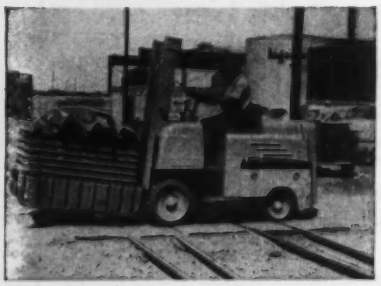
ALLIS-CHALMERS FORK TRUCKS



Dumping material by the ton — one of many daily operations.



Tracks are crossed 30-40 times daily under load without truck damage.

Inventory simplified, storage increased with ton-at-a-time tiering.

Cut Handling Time 30% at Chicago Malleable Castings Co.

In two years, Chicago Malleable Castings Co., a leading mid-western foundry, has been able to reduce handling time 30% on all materials handled with an Allis-Chalmers FT60-24 Fork Lift Truck.

In specific instances, such as the boxcar unloading of refractory brick, the truck has reduced by 90% the handling time formerly required by conveyor system.

Equipped with a rotating device, the truck is also used for handling foundry sand and other bulk materials, and also for loading, transporting, and unloading such products as bonding clay, machinery, and rough castings. All these operations have been accomplished more efficiently and in less time than was possible with equipment formerly used.

So impressive has been this performance record, that Chicago Malleable recently purchased another Allis-Chalmers truck for use in other areas of their modern plant. Used primarily for handling finished castings, including trailer-truck and boxcar loading, this truck handles 140 tons of materials in an average eight-hour day.

But utility is only part of the story. Maneuverability, ease of handling, low maintenance, and dependable, long-lived operation — even under adverse foundry operating conditions — are all features combined in every Allis-Chalmers Fork Lift Truck. It's the winning combination for progressive foundries throughout the country.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

Write today for your free copy of our 36-page, fact-filled booklet which explains in detail the many exclusive features that make Allis-Chalmers Fork Lift Trucks the choice of industry everywhere.

ALLIS-CHALMERS

JUST TRY IT!

..ask for a sample bar of La Salle's revolutionary

NEW fatigue-proof STEEL BAR

..the bar that has HIGH STRENGTH without heat treating

Yes, La Salle invites you to test a sample bar of the remarkable new FATIGUE-PROOF. This amazing new material is its own best recommendation . . . as proven by the many original equipment manufacturers who have already tested (and are using) FATIGUE-PROOF.

If you are making parts requiring strengths in the tensile range of 140,000 to 150,000 psi, and want to eliminate the expense or problems of heat treating . . . if you want to save production costs with a bar that machines faster (25% faster than annealed alloys—50% to 100% faster than heat treated alloys) and gives you a beautiful finish, too . . . if you want to improve the quality of your product while saving money, send us a blueprint, drop us a note giving application details, or better yet . . . pick up your telephone and call a La Salle sales engineer (REgent 4-7800, Chicago, Illinois).

If it appears that FATIGUE-PROOF can help you improve your product and cut your cost, he will arrange to provide the necessary test sample at no expense to you.

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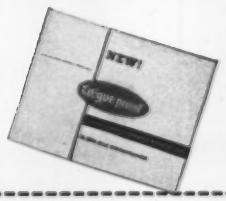
Get your copy of this 20-page booklet which gives detailed information on the remarkable new "FATIGUE-PROOF."



La Salle STEEL CO.

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Manufacturers of America's Most Complete Line of Quality Cold-Finished Steel Bars

Please send me your "FATIGUE-PROOF" Bulletin.

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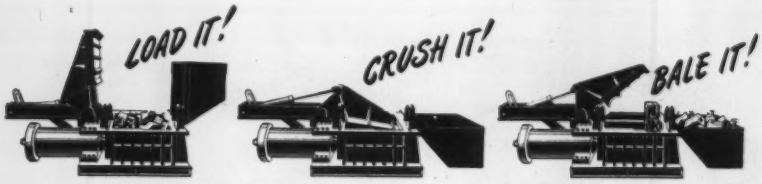
Now Dempster-Balester Presses offer you PUSH-BUTTON scrap metal baling!

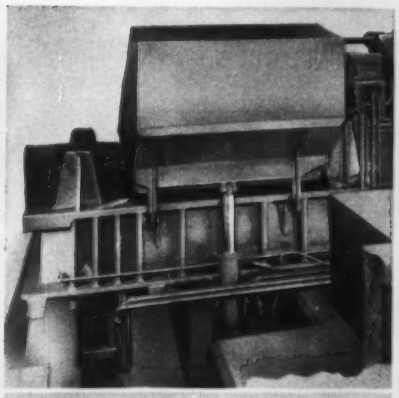
ONE MAN can PUSH-BUTTON-OPERATE one or several Dempster-Balesters! One press may be the Dempster-Balester Model 129. Another the Model 351. Another the Model 701, etc. Each may be the same model, or there may be several of one model, one of another.



IN ADDITION, one or all may be fully equipped with exclusive Dempster-Balester Auxiliary-Compression Door that enables you to bale in a 1-2-3 continuous cycle (see LOAD IT, CRUSH IT, BALE IT illustrations above). This Auxiliary-Compression Door does not "beat" or "Tamp" the scrap. It actually penetrates into the charging box, hydraulically compressing the scrap with a 45-ton force.

PUSH-BUTTON PANEL

1



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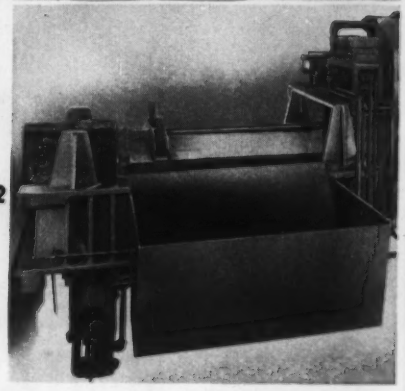


3

Photo 1 shows push-button controlled Skip Pan dumping load into charging box. Skip Pan returns to be re-loaded and (Photo 2) Charging Box Door moves out, pushing last bale forward, clear of charging box. Bale ejector returns to lowered position. Pusher rams proceed to bale the scrap and then automatically retract. Charging Box Door opens (see Photo 3), bale is ejected and Skip Pan, which has been re-loaded, is ready to dump another load into box for baling.

DO YOU NEED one Dempster-Balester or several? What model? With or without Auxiliary-Compression Door? With or without push-button control panel? Should your press produce one particular size bale, or be equipped to produce different size bales? Isn't it time we got together? Tremendous savings are yours with the right press, properly engineered and equipped to meet your particular requirements. Ask us to give you complete information. *A product of Dempster Brothers, Inc. Sold in Canada by the W. P. Favorite Co., Ltd., 418 Main Street East, Hamilton, Ontario.*

DEMPSTER BALESTER®

DEMPSTER BROTHERS, 636 Dempster Bldg., Knoxville 17, Tennessee

A Report from the

STEEL CENTER of Mid-America

SINCE
GRANITE CITY STEEL
1878

GRANITE CITY STEEL CO.—WITH TWO ROUNDS OF EXPANSION COMPLETE—NOW PLANS A THIRD WHICH WILL INCREASE PRODUCTION FOR MID-AMERICA ANOTHER 30 PERCENT

John Marshall, President, tells how and why his company is investing in the future of the Midwest and Southwest.

"Less than two years ago Granite City Steel completed an $89 million expansion program.

"Our ingot output has doubled since 1947.

"Now we are starting another major expansion to raise ingot production 30% by early 1958.

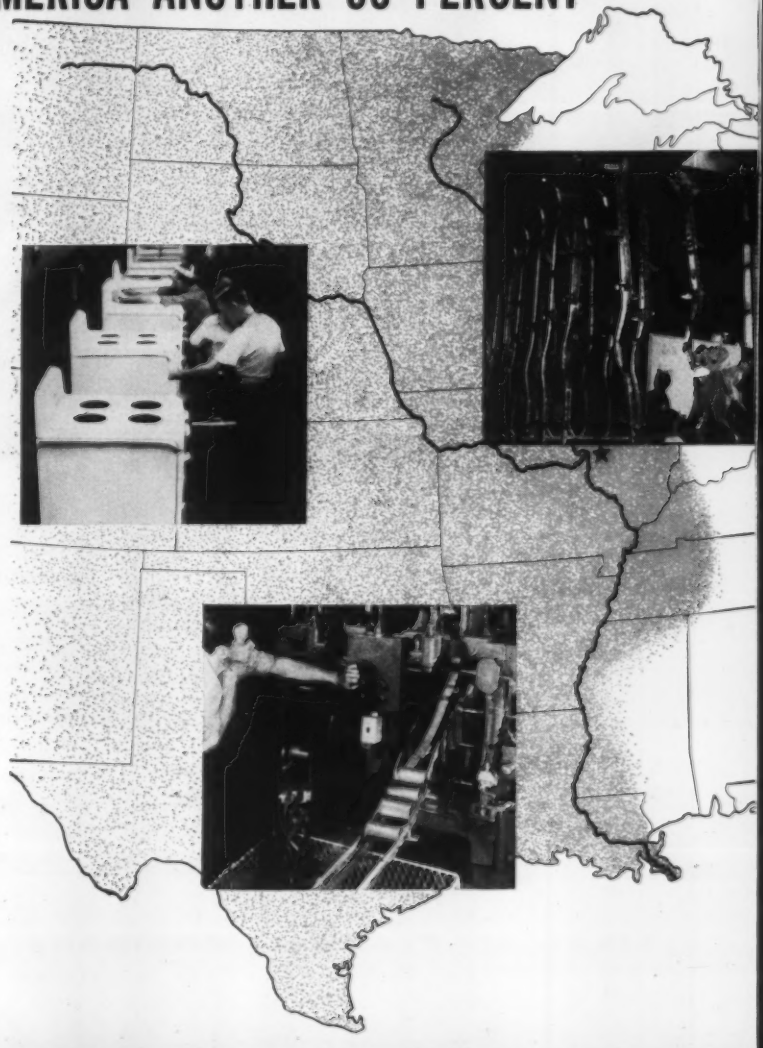
"The first benefits of this new expansion program will come late this year with increased output of hot rolled coils and sheets. Greater production of cold rolled steel will follow later.

"We are, in effect, rounding out our production facilities, to bring open hearth capacity in line with our rolling mill capacity.

"As the major basic producer of sheet steel located on the Mississippi, we believe it is our responsibility to keep pace with the healthy industrial growth of Mid-America—and to build ahead for the future.

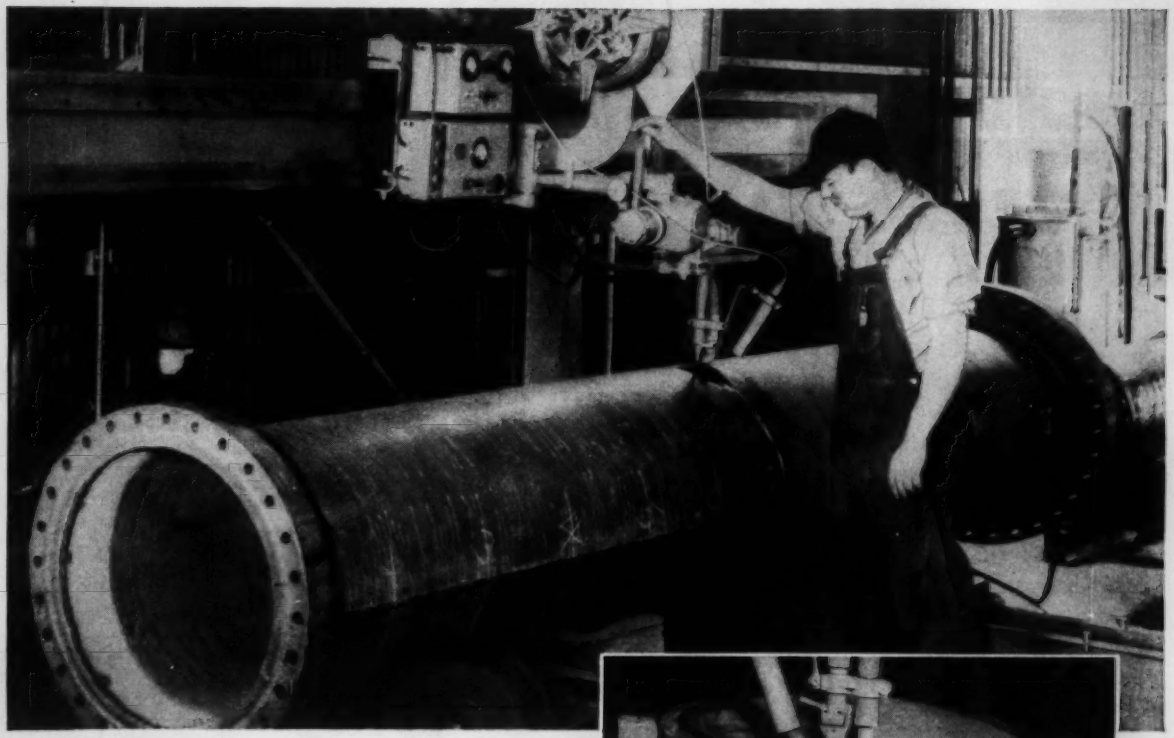
"For our economy *grows* on steel. Its production is one of the measures economists use to determine how we, as a nation, are doing, and where we are likely to go.

"In location, in transportation, in service, we are Mid-America's steel center – and the future of Mid-America looks good to us."



GRANITE CITY STEEL

And subsidiary: Granco Steel Products Co.



X-RAY-QUALITY WELDS ...75% FASTER *with* UNIONMELT WELDING

Top-quality welds are a must to assure the maximum service life of parts subject to high pressure and temperature. Like many manufacturers of pressure units, the Western Supply Company, Tulsa, Oklahoma is using UNIONMELT welding to make X-ray-quality welds (in heat exchanger shells) at new high speeds.

*** HIGH SPEED:**

UNIONMELT welding speeds average 15 to 19 in. per min.—this is as much as 75 per cent faster than welding methods previously used. The steel parts welded range from ½ to 3 in. in thickness, and welds are made in from one to three passes.

*** REDUCES GRINDING:**

Since UNIONMELT welding produces smooth, flat weld beads, the need for grinding completed welds has practically been eliminated—further reducing production costs.

UNIONMELT welding is the fast, efficient method of fabricating metals thicker than 18 gage. UNIONMELT welding makes possible increased fabricating speeds and lower production costs. Learn the details—call your local LINDE Representative for more information on UNIONMELT welding, and start saving today.

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities

In Canada: LINDE AIR PRODUCTS COMPANY

Division of Union Carbide Canada Limited, Toronto

The terms "Linde" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

Linde Trade-Mark

CONTINUOUS BAR MILL

Designed and Built by

UNITED

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses, and other Heavy Machinery. Manufacturers of Iron, Nodular Iron and Steel Castings, and Weldments.

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

Plants at: PITTSBURGH • VANDERGRIFT • YOUNGSTOWN • CANTON
WILMINGTON (LOBDELL UNITED DIVISION)

Subsidiaries: ADAMSON UNITED COMPANY, AKRON, OHIO
STEDMAN FOUNDRY AND MACHINE CO., INC., AURORA, INDIANA

UNITED *can serve you no matter where in the world you are*

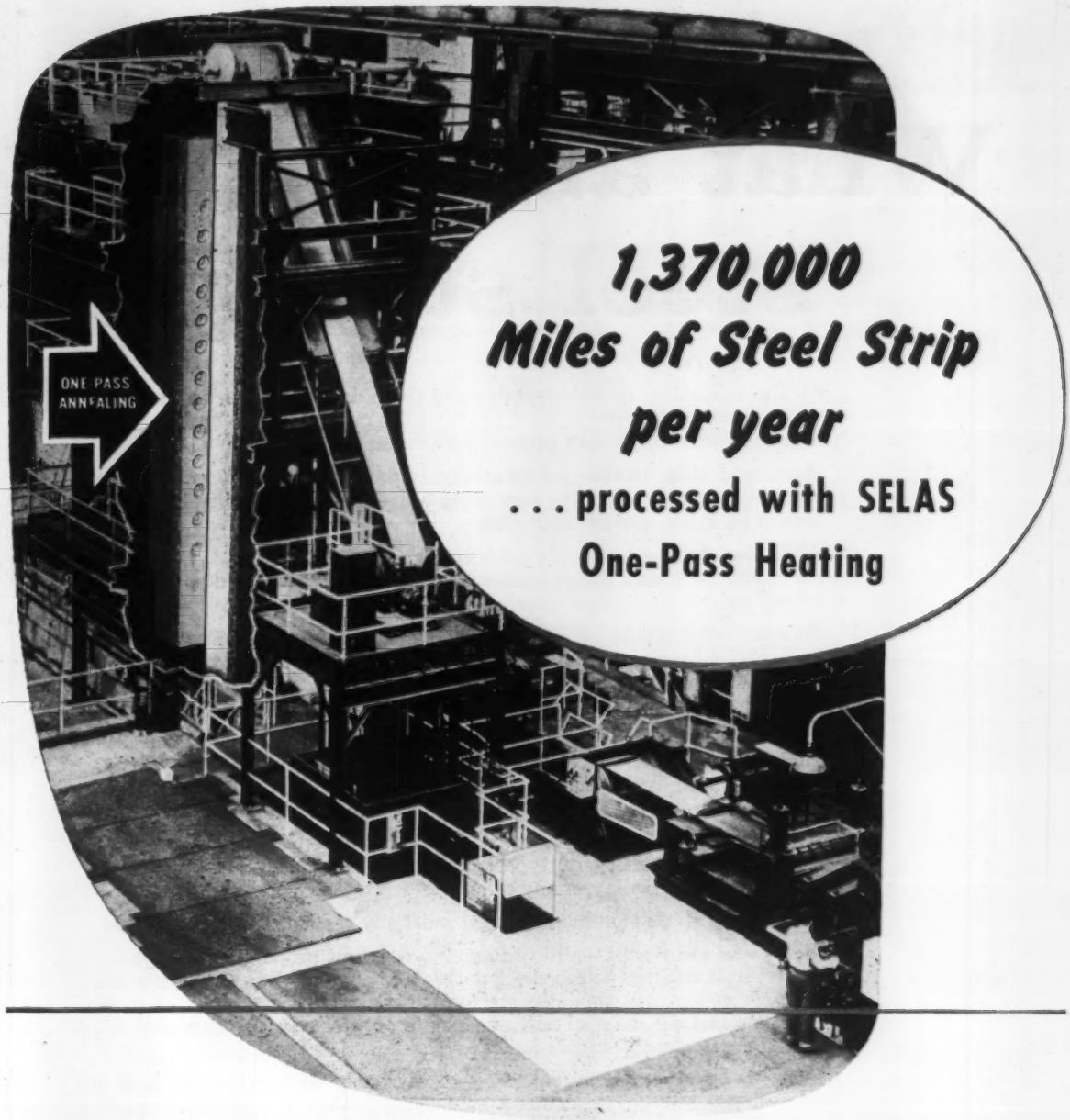
steel fabrication . . . by the forces of AVONDALE

If there is one industrial service for which Avondale is world-famous, it is steel fabrication. Avondale knows how to handle steel, skillfully and with great speed. Avondale has pioneered in the use of steel to serve the needs of many industries—in offshore oil operations, marine, chemical and construction fields. Avondale's products of steel are of outstanding quality, carefully engineered and masterfully fabricated. These products include steel ships, towboats, tugboats, barges, offshore drilling rigs, platforms, pipe jackets, porcelain enamel on steel service stations . . . and many more.

SHIP BUILDING · SHIP REPAIRING · FOUNDERS · PROPELLERS · STRUCTURAL STEEL

AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

P.O. BOX 1030 • PHONE UNiversity 6-4561 • NEW ORLEANS 8, U.S.A.



1,370,000 Miles of Steel Strip per year

. . . processed with SELAS One-Pass Heating

Enough steel strip to go around the world 55 times, is processed per year in Selas one-pass Gradiation furnace installations throughout the steel industry.

The Selas direct-fired heating principle is used in a number of continuous strip applications, including:

Bright annealing of steel . . . stainless steel annealing . . . tin reflow . . . galvanizing-annealing . . . preheat for galvanizing . . . preheat for annealing . . . bluing . . . special coatings . . . brass annealing.

In all these operations, radiant gas heat, precisely applied across the strip width, increases heating speed and produces unsurpassed uniformity in product quality.

- Compact single-vertical-pass design saves valuable floor space . . . avoids rolls in heated section and accompanying maintenance and product quality difficulties.
- Elimination of externally-prepared atmosphere in heating section reduces operating costs.
- Precise thermal control assures reproducible uniformity, regardless of gauge variations.

The same benefits are also being achieved in continuous annealing of nonferrous metals.

Our engineers will be glad to discuss how Selas Gradiation methods can be tailored to your strip-heating needs. Address Dept. 23.

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers

DEVELOPMENT • DESIGN • CONSTRUCTION

What about steel supply?

All the talk about record steel demand these days may obscure the fact that six principal types of steel products are currently in good supply at Ryerson—only three may present a procurement problem.

Sheet and strip stocks—substantially improved, especially cold rolled and galvanized stocks. We now have a good tonnage of sheet steel in almost all types, gauges and sizes.

Alloy bar stocks—no supply problem here. Call us for any type including carburizing and direct hardening alloys, heat treated alloys, leaded alloys, etc.

Stainless steel stocks—large and diversified, including large tonnages of both nickel-bearing and straight-chrome types of time-tested Allegheny stainless steel. But please give us D. O. ratings for nickel-bearing types if you have them. You will be helping to assure future availability of these types as nickel supply tightens.

Tubing inventories—excellent. Mechanical tubing, fluid power tubing, structural and boiler tubing stocks are all as complete as they have ever been.

Cold finished bar stocks—also at a high point in tonnage, in range of sizes and in diversity of types. Included: machinery steel, shafting, accuracy stock, Ledloy, many others.

Reinforcing steels—on hand to meet most any construction requirement.

Plates and structurals—still present the toughest procurement problem. However, it will pay you to check with us. Though all sizes are not always in stock at any one time, we are handling substantial tonnage of these products and will be glad to make a note of your requirements and call you if the item you need becomes available.

Hot rolled carbon bar inventories—considerably better than plates and structurals, but heavy demand sometimes makes it difficult to meet every size requirement. Still, we do have the nation's largest stocks of this commodity including many tons of many types.

Whatever your steel requirements, you can be sure of these facts when you draw on Ryerson stocks: Quality of product will be completely dependable. Service will be quick and accurate—and your orders, as always, very much appreciated.

RYERSON CERTIFIED STEELS

JOSEPH T. RYERSON & SON, INC.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

STEEL

March 26, 1956

Metalworking Outlook

Wildcats in Steel

Look for a rash of wildcat strikes in the steel industry. They often come just before labor negotiations, but this year they're earlier than usual. Youngstown Sheet & Tube Co., Atlantic Steel Co. and Woodward Iron Co. are among those that have suffered brief walkouts. Some labor observers think these wildcats presage an unusually tough time in steel negotiations that will begin about June 1.

Expansion Survey

The U.S. is unlikely to grant rapid tax amortization on much of the current steel expansion. The Business & Defense Services Administration plans a new study of requirements of basic steel capacity within the next two or three months. But the survey has nothing to do with any review of federal amortization policies. Most industry men would welcome fast tax write-offs, but it's not vital to expansion plans.

Recovery from Snow

Industries in the 12-state eastern area hit by the worst snow storm this winter are only beginning to get back to normal operations. In New York City alone, business losses are estimated at $150 million. Fortunately, physical damage to facilities appears slight. Most casualties were in the form of lost production and sales.

Business Flying Soars

Business flying continues to increase. General flying, other than by scheduled air carrier, totaled an estimated 9.5 million hours in 1955, up 6 per cent from 1954 and almost triple the number of hours flown by airlines. About half that air travel is for business, estimates the Civil Aeronautics Administration. Some 18,570 aircraft are engaged primarily in business transportation. Of those, 9750 are owned by companies, 8610 by individuals and the rest by government agencies.

Idea for Appliances

Appliance people, particularly those at General Motors Corp.'s Frigidaire Division, continue to toy with a fascinating idea. How can a well organized trade-in market be established in appliances similar to used-car distribution channels? While new appliances sales are high, some experts think the yearly volume could be at least doubled if the practice of trading in appliances were as standard as in autos. The problem has three major aspects. First, the dealer must be educated to take appliances in trade and taught how to market them. Next, consumers must be educated to turn

Technical Outlook—p. 125 Market Outlook—p. 177

in old models more frequently. Finally, manufacturers must come up with more frequent and more fundamental changes in their lines that will make the public want to buy.

Again, Production Pools

Interest in small-business production pools is picking up. Although few pools formed in the past have had outstanding success, at least one new one has been formed to try its luck. It consists of 12 small companies in Huntington, W. Va. It will seek defense contracts, particularly with the Navy. Another production pool is in the process of formation, Small Business Administration says.

WOCs Take the Stage

Watch for the issue of "without compensation" employees (WOCs) to come up again. In testifying on extension of the Defense Production Act, Commerce Secretary Sinclair Weeks told a Congressional committee that he thought it "strange" that WOCs are required to reveal their financial interests while salaried government employees are not. Mr. Weeks supports extension of the defense act for two years, but sees no need for any expansion of it or for any provision for stand-by controls.

Missile Spending To Climb

You can expect U.S. spending on guided missiles to be boosted from the $1.5-billion-a-year rate at present to about $2 billion annually. The increase isn't likely to have any appreciable effect on the economy immediately. But missile spending is bound to increase steadily over the next few years and to have greater impact on metalworking.

Aluminium Enters New Market

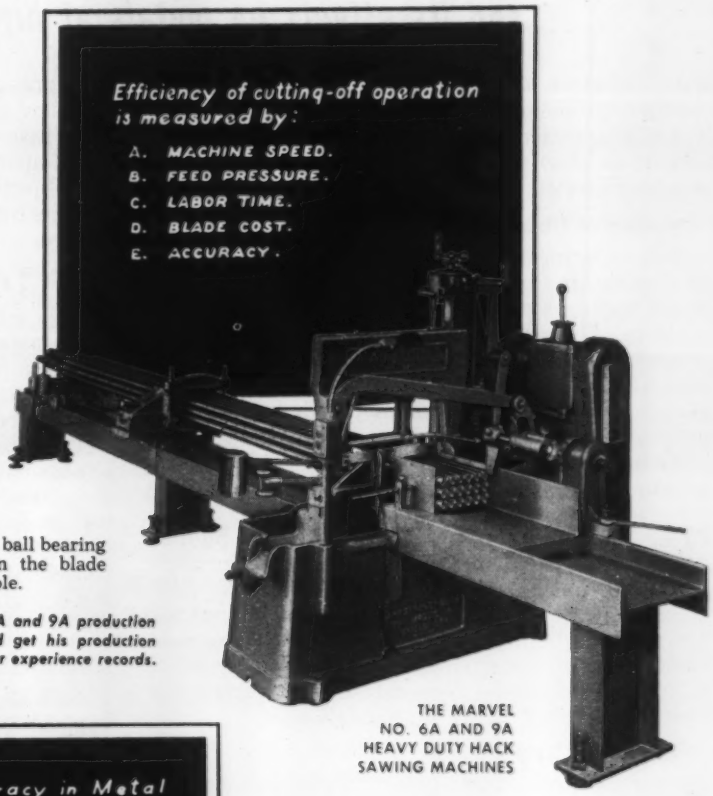
Electrical equipment wound with anodized aluminum wire is practical economically and technically, says Aluminium Ltd. Sales Inc., which is entering the motor-winding field. Aluminium's new process anodizes aluminum wire with alternating current to give it a ductile ozide coating which becomes an electrical insulation. Remaining technical problems are being ironed out with the help of leading U.S. electrical equipment manufacturers.

Straws in the Wind

Cincinnati Milling Machine Co. is entering the induction hardening business; its Process Machinery Division, which also handles flame hardening equipment, has already made its first sale, to Buick . . . A radio engineering show and Institute of Radio Engineers annual meeting brought over 7000 scientists and engineers to New York last week . . . Chrysler Corp. shareholders will vote Apr. 17 on a stock purchase program for eligible salaried employees, to "attract and retain" competent personnel . . . Raymond Loewy, industrial designer, has been contracted to design future television receiver lines of Westinghouse Electric Corp. . . . Blaw-Knox Co. says it will be able to build taller television towers by using U.S. Steel Corp.'s new T-1 alloy.

Efficiency in Cutting-off is Important

Practically all machining operations start with pieces cut-off from bars or billets. Hence, inefficiency, or lack of capacity, in the cut-off department can hold up or stagnate the entire plant.



THE MARVEL NO. 6A AND 9A HEAVY DUTY HACK SAWING MACHINES

A. Are all-ball-bearing and provide a quick return; therefore they run FASTER than others on the same work.

B. Can apply as much as 1200 pounds feed pressure—two to ten times as much as other hack saws and band saws.

C. Are fully automatic, requiring no more operator attention than an automatic screw machine; and set-up for any bar size and cut-off length is extremely simple.

D. Use a non-breakable high speed hack saw blade — the type of saw blade that produces the greatest number of square inches of metal cut per dollar of blade cost—two to ten times (or more) as much as any band saw.

E. Because of their exceptional sturdiness, ball bearing reciprocating frame, ability to tension the blade "truly taut", their accuracy is dependable.

If you are not using modern, improved MARVEL NO. 6A and 9A production hack saws, call the local MARVEL Field Engineer and get his production and cost estimates on your work—to compare with your experience records.

Formula for Accuracy in Metal Sawing:
ACCURACY = (Length, Straightness, Squareness)
(Straightness, Squareness) = (Blade Rigidity, Blade Tautness)
MARVEL
HIGH-SPEED EDGE
ARMSTRONG-BLUM MFG. CO.
CHICAGO 22 MADE IN U.S.A.

The composite MARVEL High-Speed-Edge Hack Saw Blade—cuts **any** machinable material efficiently. There is no time lost changing blades for different types of steel; no time lost replacing shattered blades, because MARVEL High-Speed-Edge Hack Saw Blades are positively **unbreakable.** These superior blades have the finest high speed steel cutting edge welded to a strong alloy steel body. They will stand-up under the highest speeds and heaviest feeds attainable on any make hack saw. Can be safely tensioned tauter than any other blade—cut-off not only straight but also square and with less stock loss.

Write for catalog C-55—showing and describing eleven different series of Metal-Cutting Sawing Machines and MARVEL-High-Speed-Edge Hack Saw Blades and Hole Saws.

MARVEL Metal Cutting SAWS
Better Machines - Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

(Advertisement)

Inco high temperature research note:

Carburization

...and its effects on metals at high temperatures

With sufficient background of information on the strength properties and corrosion characteristics, it should be entirely possible to predict the performance of an alloy under any conditions of high temperature service.

Method of Obtaining Data

Data relating to the mechanical properties may be obtained in the laboratory by any of the conventional testing methods . . . on the other hand, the problem of high temperature corrosion resistance is often so complex that it is frequently more convenient to place test specimens in an actual service environment than to try simulating industrial conditions on a laboratory scale.

This course is being pursued by Inco's high temperature engineers working in the field and in laboratories at Bayonne, N. J. and Huntington, W. Va. Creep and rupture tests at temperatures as high as 2100°F have supplied data on the strength properties of high nickel alloys. Corrosive attack by various hot atmospheres, fused salts and molten metals is being studied principally in the field to provide the type of information that will assist industry to select more suitable, longer lasting materials for various high temperature applications.

Effects of Carburization

Carburization—as may result from contact with carbonaceous atmospheres in petro-chemical or petroleum refining operations or during the heat treatment of steel parts—is one type of high temperature reaction which, under certain conditions, can change the properties of heat resistant alloys and adversely affect their performance.

Carbon diffuses into the metal and subsequently precipitates as a carbide particle rich in chromium. Compared to the alloy matrix, the carbide phase is hard and brittle. If distributed throughout grain boundaries, the particles provide a continuous path for brittle failure. (See micrograph below.) In certain types of service, carburization of a heat-resisting alloy may not be a serious matter. But in the usual case where the metal part or structure may be called upon to exhibit some measure of ductility or be subjected to impact or to drastic temperature changes, carburization often leads to premature failure.

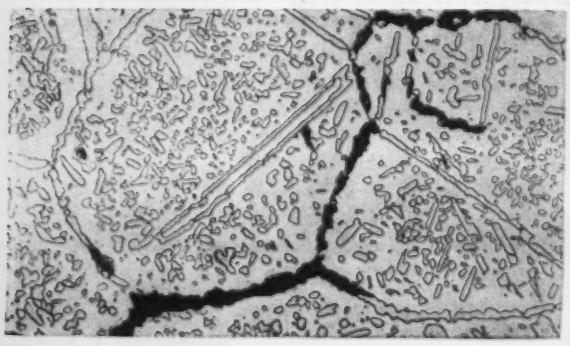
Nickel Plays Basic Role

In general terms, the susceptibility of iron-chromium-nickel alloys to carburization seems to depend upon the relative amounts of the individual components – but not as one might expect. Iron and chromium form stable carbides, while nickel does not. Yet Inco test data show that chromium has a greater effect than either iron or nickel. But it has also been demonstrated that for a given amount of chromium its beneficial effect is much greater at a higher nickel level than at a lower. Conversely, for given nickel content it would be expected that an alloy containing a higher chromium content would be more resistant to carburization.

Assistance Available

Inco high temperature corrosion test data also suggest that silicon improves carburization resistance, as does the presence of carbide stabilizing elements, such as titanium and columbium. Under extremely severe conditions of carburization, the effect of these elements is but temporary, and after sufficiently long exposure, their value is lost.

In a fast growing field such as this, it is impossible to have an immediate answer to every problem. But if high temperature performance is a problem to you, whether in present activities or in new projects, Inco High Temperature Engineers will do their best to help you. Let them send you the High Temperature Work Sheet . . . it is a big aid in getting the facts down clearly. Send for a copy now.



INCO
TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

Please send me the High Temperature Work Sheet so that I may outline my problem to you.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

Boom or Bust?

Are we headed for a boom or bust?

These alternatives are suggested in a thoughtfully prepared report to stockholders by the United States Steel Corp. It calls attention to what appears to be a permanent and alarming peacetime trend of cost and price inflation.

Taking 1940 as 100, U. S. Steel's employment costs rose during the war years, 1940-1945, to about 145. In the ten years since 1945, there has been an even greater increase. The 1955 index stood at about 320. For the 1940-1955 period, the average annual increase was 8 per cent compounded.

U. S. Steel also pays more for taxes and the things it buys because of a parallel increase in employment costs throughout industry and the government. During the 15 years since 1940, U. S. Steel's total costs per employee hour have gone up 8.7 per cent compounded annually.

Since output per employee hour could not increase at anything like these rates, U. S. Steel has found it necessary to raise prices from time to time. It has been forced to pass on to buyers of steel a part of the underlying cost inflation.

The report notes that wartime inflation is characteristic of American history; peacetime inflation is not. In each of the decades following the War of 1812, the Civil War and World War I, wholesale prices dropped to 46, 59 and 74 per cent of the level in the last war year. In the decade after World War II, they did not decline, but rose to 161 per cent of the 1945 level.

This postwar inflation has two basic roots. One the report assigns to unions headed by men with the power to call national strikes and who try to outdo each other in securing wage and benefit increases. Such organizations contribute to employment cost inflation.

The other is the government's full employment policy under which the money supply must be increased fast enough to accommodate the inflating employment cost. Otherwise, workers could be priced out of their jobs, even though temporarily.

The great danger lies in the complacency with which inflation is regarded and the recurring tendency of inflation to become speculatively explosive.

Americans don't want a boom that will explode into a bust. They want orderly expansion in keeping with a growing population. The decision is in the laps of labor leaders and those in government who control monetary policy.

Irwin H. Such
EDITOR-IN-CHIEF

WHEN AUTOS CAME IN ONE COLOR

Hard to believe, isn't it, that the "last word" in the autos of our youth are now museum pieces. The automotive industry has drastically changed our mode of living and today is meeting the challenge of an apparently insatiable public demand for higher standards of design, power and comfort in personal transportation. Many of the advances in car design and performance have been made possible by improved steels. Working with automotive manufacturers to provide the *right* steels has been one of the important jobs at Inland for many years.

INLAND STEEL COMPANY *38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York. Steel products supplied to the automotive industry include hot and cold rolled sheets and strip, bars, plates, structurals, 4-Way safety plate. Other products: tin mill products, Ti-Co galvanized sheets, reinforcing bars, rails and track accessories, coal chemicals.*

Big Expansion Means Upturn

Look for new plant and equipment expenditures to approach $35 billion this year, a new high. Such outlays can bring peak economic activity in 1956 despite lower auto output

Industry Boosts Capital Outlays

(Millions of dollars)

	1956*	1955	1954	1953
Manufacturing	15,036	11,439	11,038	11,908
Durable goods industries	7,685	5,436	5,091	5,648
Primary iron and steel	1,327	863	754	1,210
Primary nonferrous metals	418	214	246	412
Electrical machinery & equipment	579	436	439	475
Machinery, except electrical	1,016	809	694	797
Motor vehicles & equipment	1,863	1,128	1,295	989
Transportation equipment, excluding motor vehicles	477	274	191	180
Stone, clay and glass products	685	498	361	346
Other durable goods	1,320	1,214	1,110	1,239
Nondurable goods industries	7,351	6,003	5,948	6,260
Food and beverages	813	718	765	812
Textile mill products	389	366	331	378
Paper & allied products	712	518	455	409
Chemicals & allied products	1,426	1,016	1,130	1,428
Petroleum & coal products	3,322	2,798	2,684	2,668
Rubber products	176	150	131	161
Other nondurable goods	513	437	451	404
Mining	1,141	957	975	986
Railroad	1,307	923	854	1,311
Transportation other than rail	1,784	1,602	1,512	1,565
Public utilities	4,989	4,309	4,219	4,552
Commercial and other	10,636	9,471	8,230	8,000
TOTAL	34,893	28,701	26,827	28,322

Source: Commerce department, Securities & Exchange Commission. *Estimated

THE NATION'S economy will get a king-size shot in the arm this year with a record $35 billion planned for new plant and equipment expenditures.

Excellent economic health appears assured for 1956 by such capital outlays which would be $3 billion higher than an earlier estimate for the year and 22 per cent above the capital spending for 1955. The predictions for 1956 are "about the best economic news so far this year," says Commerce Secretary Sinclair Weeks whose department makes the estimates, in co-operation with the Securities & Exchange Commission. The prognostications are based on industry thinking sampled over several weeks, from late January to early March.

Capacity Up — A survey by STEEL indicates that metalworking expects to boost its capacity by 6 per cent in 1956—4 per cent in primary metals, 8 per cent in fabricated metal products, 5 per cent in machinery (except electrical), 7 per cent in electrical machinery, 4 per cent in transportation (see page 99), 7 per cent in instruments and 2 per cent in other metalworking categories. Some 60 per cent of all metalworking plants expect to increase their capacity. About 15 per cent will build new plants; 40 per cent will construct additions; 88 per cent will buy equipment.

Present schedules indicate capital spending at the seasonally adjusted annual rate of $34.5 billion in the first half of this year and $35.5 billion in the last half. The steady rise during the year is attributable to manufacturing, railroad and other transportation industry programs.

Consistent Rise—All major industries are planning substantial increases in investment programs in 1956, with the greatest strength indicated for manufacturers, particularly the durable goods industries, and railroads. Manufacturers anticipate record outlays of $15 billion, up 31 per cent from last year, while railroad investment is up 42 per cent. All other industries show increases from

1955 ranging from 10 to 20 per cent (see table).

Record expenditures are being scheduled by the motor vehicle and iron and steel groups, with programs totaling $1.9 billion and $1.3 billion, respectively. Those industries and the nonferrous metals and nonautomotive transportation equipment groups are each planning spending in 1956 that will be more than 50 per cent greater than in 1955. The big gains in nonferrous largely result from aluminum expansion.

Consumer Confidence—The SEC-Commerce survey reveals that businessmen in every major industry group anticipate sales in 1956 will exceed the 1955 total. Manufacturers expect a 6-per-cent rise; trade firms foresee a 4-per-cent increase; and public utilities anticipate a 9-per-cent gain.

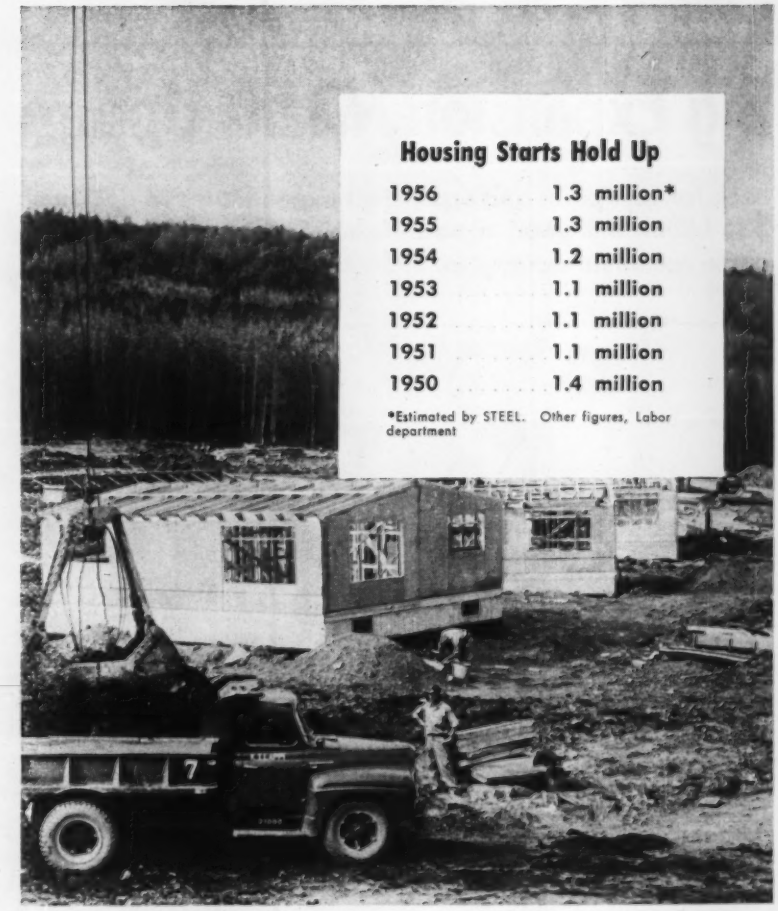
A Federal Reserve Board survey of consumer psychology reveals that 64 per cent of them expect good times (see page 103).

Take a Look, Jules Verne

The "Scorpion," a 5-million-lb steel structure that would have stirred the imagination of Jules Verne, made its bow last week at Galveston, Tex.

It's a mobile offshore oil drilling platform designed and built by R. G. LeTourneau Inc. for Zapata Off-Shore Co., Midland, Tex. The "Scorpion" is a three-legged, completely self-contained steel island representing a total investment of about $3 million. The steel legs, or spuds, are 140-ft open-design units, truss braced with tubular steel for stress loads. Twenty-one electric motors, seven to each spud housing, driving through gear reductions, raise and lower the platform on the spuds. The unit's body is a barge until it reaches location. There the legs lower to the ocean floor, and the platform elevates itself to the desired height.

The platform's living quarters accommodate 46 men. They are above deck at the rear, while the derrick is forward on an elevated floor. When the well is completed, derrick and floor slide back to clear the well. The hull lowers to floating position and is towed to the next location.



International Harvester Co.

Homebuilding Picks Up

NONFARM housing starts have at last ended a six-month slump. Look for a 1.3-million year in 1956. Officials like Housing & Home Finance Administrator Albert M. Cole are revising predictions upward to that figure from 1.2 million.

That still won't be a record, but it's creditable (see table). "Almost everyone," says Dr. George Cline Smith, vice president of F. W. Dodge Corp., "expected the housing downturn which began late in 1955 to continue for several more months. But residential contract awards compiled by Dodge in the first two months this year ran 6 per cent ahead of the same period last year. The total of $1.5 billion of residential awards is a new record for any January-February period."

Upturn — February starts advanced to 78,000 units, the Bureau of Labor Statistics reports. That represents a seasonally adjusted annual rate of 1.2 million units, which exceeds the February rate in all years except 1950 and 1955.

The February performance compares with 74,000 starts in January. Until February, there had been a steady monthly decline in housing starts since last August. Preliminary reports from building-permit issuing localities indicate that all regions of the country contributed to the expanding volume of housing during February.

Feast or Famine?

U. S. Steel looks for answers on means to stabilize production patterns

"AS the nation goes, so goes U. S. Steel Corp.—only twice as fast." With those words in its annual report, the corporation sums up its (and the industry's) biggest problem: Feast or famine, boom or bust (see editorial, page 83).

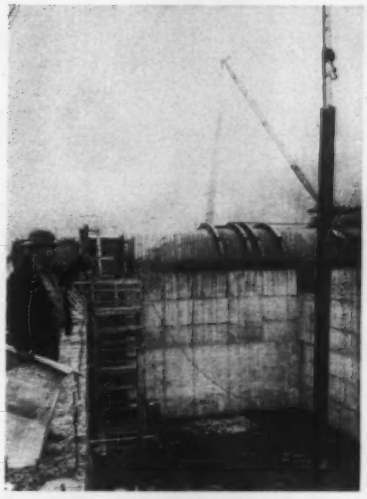
Look at U. S. Steel's operating rate. In mid-1953, operations were at capacity. By summer, 1954, the rate had fallen below 65 per cent. By the end of 1955, operations again were near capacity. Notes the report: "If customers had been able to utilize idle capacity through 1954, there might have been no steel shortage last year."

Touchy—Any cure-all looks a long way off. Because steel products are durable, purchase of new ones often can be postponed when business declines. Conversely, when business is booming, customers rush in to buy preferred autos, houses and industrial facilities.

Effects are compounded, says the report, because: "When customers' sales increase, not only are steel requirements expanded, but inventories must be built up to support the higher level of activity. When business declines, purchases of steel decline more than proportionately to reduce inventories until they're compatible with the reduced production rate."

Inflation — Commenting on another problem, the report notes that since 1940, labor costs have risen 218 per cent, with similar increases in other production costs.

"Since it is impossible for output to be increased at anything like these rates, it has been necessary from time to time to raise steel prices and pass on to buyers part of the inflation. According to the Bureau of Labor Statistics, prices of steel mill products increased 119 per cent between 1940 and 1955. None of that increase has resulted in widening the percentage spread between costs and sales prices. U. S. Steel's income as a per cent of sales (9 per cent) was less in 1955 than in 1940, despite 1955's higher operating rate."



Steel for Atom Power

U.S. Steel Corp.'s American Bridge Division is fabricating and will erect 1800 tons of structural steel framework to house the turbine room at Duquesne Light Co.'s atomic power plant at Shippingport, Pa. First full-scale atomic power plant in the U.S., the new facility is expected to be in operation in 1957 producing a minimum 60,000 kw of electricity

After the Strike

Westinghouse consumer products plants will recover fastest. Heavy machinery, a month

HOW FAST can they get back into production?

That was the question uppermost in the minds of metalworking management after Westinghouse Electric Corp. and the International Union of Electrical Workers came to terms last week.

Answers—At nine of the 30 consumer products plants idled by the IUE strike, work was resumed within 24 hours. Others were expected to be operating in a few days. But in the heavy machinery divisions, it will take longer. Maintenance workers will have to clean up before men go back on the job.

Meanwhile, negotiations were proceeding with representatives of 10,000 Independent United Electrical Workers (UE) still on strike, many at the steam turbine plant in Philadelphia. Even after all men are back on the job, it may be as long as a month before full production is resumed at all plants.

Terms—The IUE contract runs for five years from the time the strike began last October. It gives annual wage increases of about 3 per cent above present rates; with a minimum of 5 cents an hour now, again on Oct. 15, 1956, and again on Oct. 14, 1957. Subject to arbitration, it provides that the company may make time studies on any day work or salary jobs to measure or improve production, for methods analysis or budgeting.

Comments Robert D. Blasier, vice president-industrial relations: "The agreement gives us five years of contract protection we had to have to compete effectively in the electrical manufacturing industry. The time study provision assures that Westinghouse will not fall behind competitors in operating efficiency."

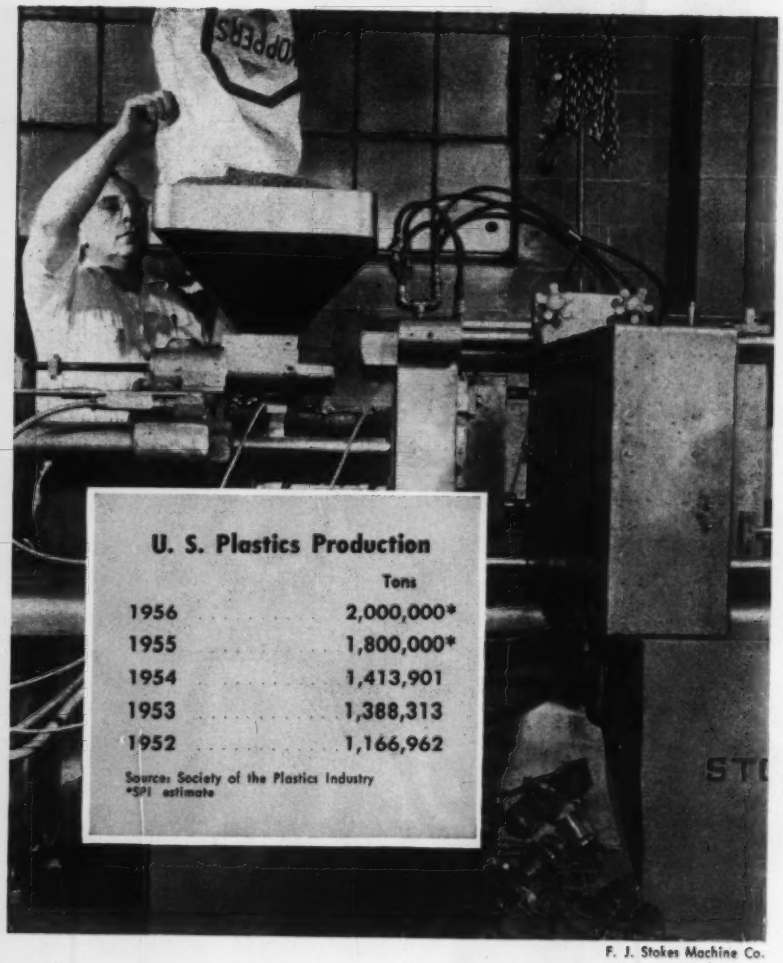
Quotes — Labor observers point out that these settlement terms differ little from the original proposals of the Federal Mediation board (STEEL, Mar. 19, p. 43). Pension and insurance provisions are little changed from original offers.

But observers add that strike-caused bitterness and loss of morale can't be measured in dollars. Significant: The company lost some of its middle-management talent during the strike. The IUE has lost not only the support of many members but also that of other labor leaders.

Unemployed Ranks Thin

Some 16,000 workers went back on the job between Feb. 26 and Mar. 5, notes the Department of Labor. State insured unemployment totaled 1,519,500, down more than 320,000 from the same week a year ago.

In a special report on seven states having more than 75 per cent of workers in auto manufacturing and supply, the Labor department says that 14,000 were called back during the week ended Mar. 10. Total unemployment in the industry amounted to about 95,000.



F. J. Stokes Machine Co.

Automatic plastics forming machines may lead the way as . . .

Plastics Hit 2-Million Tons

FROM HERE on in it looks like a one-way street for plastics producers and forming equipment manufacturers: Rising plastics production (see table) should be matched by increased machinery sales.

There's not much of a replacement market for the many new machines purchased by the industry in its strong expansion program after World War II, but that situation may change, too.

Some branches of the plastics industry will grow faster than others, and equipment makers are planning accordingly.

Fastest Growing—The Society of the Plastics Industry Inc., New York, reports production of polyethylene plastics jumped 50 per cent from 1954 to 1955. That means sales of injection, compression or blow molding equipment and extrusion, calendering or casting machinery.

The use of polyester resin in reinforced plastics increased 80 per cent last year. Reinforcing, molding, casting or impregnating methods form polyesters into end products.

Production of polystyrene molding materials rose 30 per cent in 1955. Methods required here include: Injection or compression molding, extrusion, laminating or machining.

Trend — Several pressmakers report a trend to the use of hydraulic presses in reinforcing plastic. Although the material is relatively new and its engineering properties unfamiliar, producers expect to find new applications in such fields as boats, furniture, vacuum cleaners and automobiles (as in the Chevrolet Corvette).

"The sale of hydraulic presses is growing at the same rate as the plastics industry," notes John C. Coonley, president, Hydraulic Press Mfg. Co., Mt. Gilead, O.

A. A. Hutchings, vice president of sales, F. J. Stokes Machine Co., Philadelphia, thinks his firm will be pushed to match last year's excellent sales record. He expects the demand for injection presses to be about equal to last year's.

Thermoplastics — Sales of injection presses, used in thermoplastics production, in 1955 were about $21 million. David Sloane, vice president, Lester - Phoenix Corp., Cleveland, estimates sales as strong this year.

Compression molding is the most common method of forming thermosetting plastics. Laminating presses are growing more important in this field, says Lloyd Adam, sales manager, Erie Engine & Mfg. Co., Erie, Pa.

Automation — Equipment suppliers believe plastics producers are growing more aware of the labor-saving possibilities of automated machinery. Stokes officials point out: "Fully automatic compressor or injection molding has greatly widened the area of plastics molding application by reducing the unit labor cost to the vanishing point."

The market for machinery to form plastics looks like this: 1200 firms produce finished plastic products using a mold; 250 firms extrude plastics; 120 combine liquid plastic resin with reinforcing materials; 60 film and sheeting processors use calendering, casting or extruding techniques; 80 firms coat fabric or paper with plastics; and 50 firms form sheet, rod and tube from paper or cloth impregnated with liquid resin.

Scrap Men Probe Problems

Nonferrous dealers experience growing pains as demand for scrap rises steadily. Sore points: Export policies, pricing, competition for materials

PEAK DEMAND for nonferrous scrap has intensfied the problems of scrap dealers, smelters, refiners and exporters.

During the annual meeting (Mar. 11-14) of the National Association of Waste Material Dealers Inc., representatives from each segment of the nonferrous scrap industry participated in a panel discussion.

Pro and Con—Exporters feel that so long as semifinished or finished copper mill products can be shipped to Iron Curtain countries, there should be no limitation on the exports of copper-base scrap. A quick rebuttal came from Alvin A. Meyrowitz, H. Kramer & Co.: "Export shipments must be dependent on the available supply of scrap after meeting domestic needs."

Henry Lipkowitz, Atlas Metals Co., pointed out to delegates: "The modern dealer, seeking to perform his function properly, must invest in plant, equipment and inventory. If he is to operate effectively, he should not be forced to compete with consumers in buying nonferrous metals."

Changing Roles—Dealers were quick to report that the high-level demand for scrap metals has made some smelters competitors rather than customers. The dealers' position: 1. The dealer is the stockpiler for the consumer. 2. He must take risks when demand is low. 3. He must have supplies available for the consumer when the need arises. 4. The function of dealer and smelter must be separate.

One ingot maker replied: "We, as ingot makers, cannot exist without the dealers in the U.S. I am sure that the custom smelters and the exporters are in the same position. Dealers move into the far corners of our country to collect the scrap which is generated daily."

Dollars and Cents — Custom smelters turned the discussion to pricing. They explained that scrap prices always have been based on the world markets for metals. "In copper," said Theodore Gruen, International Minerals & Metals Corp., "a downward market causes too many losses because many dealers do not recognize that the outside market has more to do with the pricing of his scrap than has the U.S. producer's price of refined copper."

Another Point—Dealers also are interested in deriving some type of premium for baling or billeting scrap materials. Example: Dealers say billeted aluminum scrap should receive a 1-cent-a-pound higher price than loose clips.

Crux — The scrap industry is going through growing pains. Changes are in store. Each change is likely to hit someone (dealer, smelter, refiner, or exporter) in his most vulnerable spot — the pocketbook.

Domestic Demand for Nonferrous Scrap Continues

	U. S. Consumption Net Tons		Imports* Net Tons		Exports Net Tons	
	1955	1954	1955	1954	1955	1954
Aluminum	465,780	365,350	40,780	14,840	18,300	39,340
Copper	1,377,580	1,239,030	24,580	9,930	76,100	169,750
Lead	610,900	638,020	18,900	7,440	2,990	3,890
Zinc	219,280	199,450	280	1,090	21,610	16,690

*Also included in U. S. Consumption
Source: National Association of Waste Material Dealers

Triggers Set

The program for emergency output of machine tools in case of war is ready

THE PATH has been cleared for a $256-million machine tool program to be "triggered" in case of emergency.

Purpose—It is aimed at carrying the industry at top speed through the first six months of war, avoiding the usual time lag between the placement of contracts for end items and the contracts for machine tools to produce them.

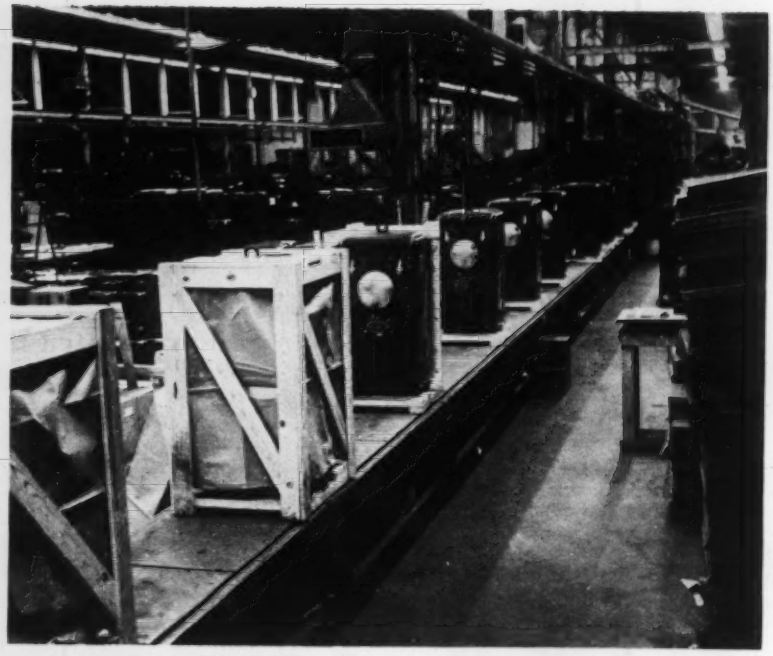
Machine tool builders would, in effect, be guaranteed a market for their products during this six-month period.

Mechanics — The Office of Defense Mobilization has set aside $21 million to provide working capital for producers of general purpose tools under the M-Day Machine Tool Pool Order program. Producers with "trigger" orders would be able to borrow up to 30 per cent of the value of the items to be produced, even though one of the aims of the trigger orders is to allow holders of such orders time to provide for their own working capital. During the Korean War, about three-fourths of machine tool producers supplied their own working capital.

Lists of tools to be included are being developed by the Business & Defense Services Administration and will be reviewed every six months to make sure that tools on order will do the job required in an emergency.

Freight Rates Alarm Coal

Pipelines and barges may be the coal haulers of the future. The reason, says George H. Love, president, Pittsburgh Consolidation Coal Co., is the "shortsightedness" of the railroads in "everlastingly increasing rates on coal."



Idealarc welders roll down the line at Lincoln Electric Co.

Welder Sales To Spurt

WELDING machinery manufacturers look for sales to spurt to a new high this year.

Reasons: Product development and sales efforts are maturing in time to take advantage of the biggest capital spending spree in history. New plant and equipment outlays may run $35 billion, up 22 per cent from 1955. Result: A $125 to $130 million year for resistance, arc and gas welding machinery, up at least 20 per cent from last year.

Resistance — Resistance Welder Manufacturers Association, Philadelphia, reports that members rang up a $5.5-million record in new orders this January. R. Bruce Wall, secretary-treasurer, doesn't think that this rate can continue. But it is possible, he says, that members' sales may hit $40 million for the year, compared with $32 million in 1955.

Add in the sales prospects of Sciaky Bros. Inc., Chicago, not an association member, and you have a fair picture of the outlook in the resistance end of the business. Last year, Sciaky's sales were the best since World War II, and it's looking for another increase in 1956.

Arc — Arc welding machinery also is going well. Product development is one big reason. Says J. S. Roscoe, vice president, Lincoln Electric Co., Cleveland: "We're continually trying to bring welding costs down." Sales of Lincoln's new arc welder, giving alternating or direct current at the flip of a switch, are up 50 per cent in the last six months. Mr. Roscoe says he has one customer that estimates it saves 25 per cent on all welding costs using the new machine with iron powder electrodes.

Harnischfeger Corp., Milwaukee, looks for sales to jump one-third to one-half above 1955. It's putting more machines and men behind its efforts to get the equipment out. Marketwise, experts from General Electric Co., Schenectady, say that booming aircraft and railroad activity will spur production. Hobart Bros. Co., Troy, O., cites road construction as a big market for gas-engined arc welders.

Old Faithful — Gas welding is still expanding. Linde Air Products Co., division of Union Carbide & Carbon Corp., New York, points to maintenance and sheet metal work as major markets. Advantages: Equipment is simple and can handle most metals.

Sums up Air Reduction Co., New York: "Sales of gas welding equipment will be up 12 per cent this year; arc welding will come in some 17 per cent better; and inert gas 20 per cent better."

Trends — For Liquid Carbonic Co., Chicago, the trend is to de-emphasize gas welding. It looks for big expansion in submerged arc welding using carbon dioxide as the shielding medium. Linde, too, is betting heavily on the gas-shielded arc welding process: "The switch to aluminum in transportation equipment and the increasing use of stainless and high-alloy steels in jet aircraft mean a much faster growth."

Some manufacturers, like Taylor-Winfield Corp., Warren, O., are diversifying. The company is capitalizing on its experience with highly automatic resistance equipment in the arc welding field. It buys standard arc heads, then engineers them into equipment that's an integral part of a production line.

Others, like Federal Machine & Welder Co., also of Warren, are subcontracting work to bring down order backlogs. Federal's now stands at nine months, instead of the normal four. Many companies complain that shortages of steel and copper are causing problems.

Research—All major manufacturers continue to stress product development. Linde says it has geared research to anticipate industry problems. It expects that new products will play a big part in handling many processes that have been industrial liabilities.

Says Lincoln: "Ten or twelve years ago, we had a chief engineer responsible for all manufacturing activities. Now we have an engineering vice president, a research vice president, two chief engineers and a separate application engineering department."

Power Boat Sales Zoom

More leisure time, fatter pay checks and better design are boosting the demand for pleasure boats. Sales have nearly doubled in five years

THE POWER BOAT industry is setting its course for another record-breaking year.

Ralph G. Klieforth, head of the National Association of Engine & Boat Manufacturers, and president of the Universal Motor Co., looks for "an appreciable increase" over the peak year of 1955. A fivefold increase in the number of boats and engines manufactured for pleasure boating in the last ten years calls for a reappraisal of the metalworking activities of this industry.

Big Business—Last year, $1.1 billion was spent at the retail level for new and used boats, accessories, insurance, docking maintenance, etc., according to the association. Some industry leaders believe expenditures this year will splash up to $1.2 billion, almost double the $650 million spent only five years ago.

Behind this burgeoning expansion are various reasons. Foremost, in the opinion of Chris-Craft's Ed Pickell, is the unprecedented rise of individual income. He also credits increased leisure time and observes that "new lakes created for flood control and hydroelectric projects are playing their share in expanding the potential for boat sales in previously arid regions."

Design, Too — Mr. Klieforth places improvements in the design of boats and engines high on the list. Add sound promotional efforts and you get an idea of the alertness of an industry that includes some 300 builders of stock boats; possibly 200 established manufacturers of custom-built boats; 30 or so builders of inboard motors, including diesels; an estimated 25 builders of outboard motors of the brand name variety, headed by possibly four or five especially large manufacturers; and a large number of accessory makers.

Let's Race—Organizational activities of the boating fraternity do much to fan interest and enthusiasm. Currently, 300 racing organizations are operating under the sponsorship of the American Power Boat Association, and probably another 500 local groups without national recognition are devoted to family boating and outboard cruising.

Today, more than 800,000 inboard powered pleasure craft and more than 4,170,000 outboard motor boats operate on the country's waterways. In addition to various run-about types, a popular and evergrowing classification is the small conventional inboard type of family cruiser, 20 to 30 ft, sleeping four and sometimes six in a pinch, and priced anywhere from $4000 to $10,000. Virtually a trend within a trend is the increasing interest in the outboard cruiser, 18 to 24 ft.

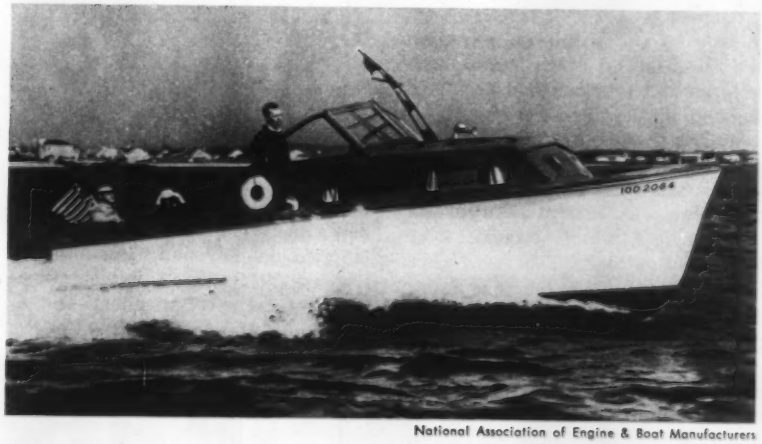
Power boats have many practical as well as recreational applications. For instance, an increasing number are being used by industry.

In addition to wood, hulls of an increasing number of light craft are being built of aluminum and reinforced fiber glass. Perhaps 20 per cent of the small craft, 18 ft and less, are constructed of aluminum; 12 to 15 per cent of plastic. Five years ago, about 10 per cent were built of aluminum and practically none of plastic.

Extras — Accessories cover a wide range of items—marine hardware (which in itself covers a wide range), electronic equipment, canvas and cordage, engine and propulsion equipment parts, paint and surface coatings, petroleum products and marine clothing.

Boat trailers are an accessory which have come to the fore remarkably fast. There are more than 600,000 in use. Less than ten years ago only a few thousand were being produced. Last year the dozen or so members of the Boat Trailer Manufacturers Association, who account for the major output of these units, built 150,000 trailers (50,000 more than the year before).

Future — Robert R. Lutz, Century Boat Co., says: "There's no question that the boating industry is in the early stages of a boom like the automobile industry enjoyed some years ago. With emphasis on recreational activities which the whole family can enjoy, there's nothing to indicate any leveling off in the future."



National Association of Engine & Boat Manufacturers

This 1956 cruiser has a dinette, galley, sink, icebox and room for four to sleep

Other jobs may crowd out Hoover action as . . .

Congress Sits on Report

GOVERNMENT is going slow on recommendations of the second Hoover Commission.

One reason: The second report is more controversial than the first, which dealt mostly with physical reorganization of the executive branch. It takes a closer look at the functions and operations of agencies, gets into policy.

Competition—Although the report promises savings of $5.5 billion a year, the public isn't particularly excited. Competing for legislators' time with farm problems, highway and school legislation, lobby investigations, etc., the commission's statistics wind up far down the list.

Plain old government inertia is involved, too. Reports have to be "studied" and that takes time. But the pieces are beginning to come together, and the administration will propose legislation within the next few months, says Meyer Kestnbaum, special assistant to the President.

Coming Up—He told a U. S. Chamber of Commerce National Action Conference on the Hoover Reports that some of the most important proposals may be worked out in the next few weeks.

Of the Hoover Commission's 314 recommendations, 141 can be put into effect by administrative action, 122 require specific legislation, 51 require joint action by Congress and the administration.

Action—Some progress has been made. More than 250 bills have been introduced in Congress. About 15 proposals are now law.

It's estimated by the Citizens' Committee for the Hoover Report that approval of just 40 of the bills still pending would go a long way toward realizing major goals.

Targets — Areas that Herbert Hoover views as noncontroversial and in need of quick action are reforms in budgeting and accounting and in the Civil Service.

What's needed, says Mr. Hoover, is a budget that can be understood and is based on actual costs, not on obligations, contracts awarded and services which require long future obligations.

Faults—He points out that many principles and practices of budgeting and accounting are 35 years old. In those days, the government's expenditures were $4 billion a year, compared with $65 billion; the payroll 850,000, compared with 5.2 million.

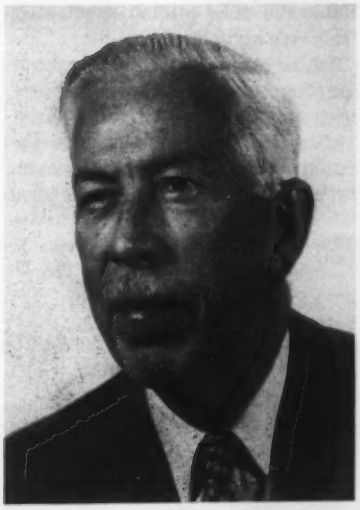
The Hoover Commission Task Force on Budget and Accounting reported that improved financial management could save $4 billion per year, which is about 8.5 per cent of controllable budget expenditures.

Turnover—Big savings could be made by cutting down government personnel turnover which is over 25 per cent a year—enough to bankrupt any private enterprise every six months.

Mr. Hoover recommends a Senior Civil Service, with enough pay, security and prestige to retain top administrative talent. It would be nonpolitical; policy making would be done by 2000 to 3000 men appointed by the President.

Views—Some feel an encouraging start has been made in putting the commission's recommendations into effect; they point out that it took four years for 72 per cent of the first commission's proposals to be adopted.

Others say: Money's a wastin'; let's get moving.



Meet Irving P. Macauley: The new director of the Aluminum & Magnesium Division, Business & Defense Services Administration, is a retired vice president and a director of Reynolds Metals Co. He will serve the government about six months. In Washington he can be contacted at the Commerce department, room 4807. Phone STerling 3-9200, ext. 4437.

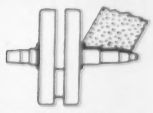
Just Push a Button...

diameter and adjacent shoulder are ground automatically

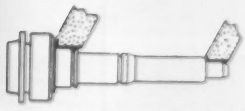
Push-button grinding saves operator effort and reduces cost. Four diameters, three radii and two shoulders are ground on steering knuckles at the rate of 96 per hour.

TRANSMISSION DRIVE GEAR

STEERING KNUCKLE



CRANKSHAFT



TRANSMISSION EXTENSION

Pushing a button to perform useful work is a good habit to acquire. It's such an easy way to do a better job at lower cost. The operator of the new CINCINNATI FILMATIC Angular Wheel Slide Grinder, illustrated above, pushes a single button and eleven events follow automatically:

1) Table clamped in position
2) Wheelhead rapidly advances
3) Grinding fluid turned on
4) Work rotation starts
5) Work ground at "coarse" feed rate
6) Grinding feed rate changes to "fine"
7) Tarry
8) Wheelhead rapidly returns
9) Work rotation stops
10) Grinding fluid shut off
11) Table unclamped

To support this fine semi-automatic performance (loading and unloading are manual) the machine is equipped with automatic grinding wheel balancing, an exclusive Cincinnati feature that promotes the finest finish and saves hours of time. Of course, the spindle is mounted on the famous CINCINNATI FILMATIC bearings, the bearings of perpetual youth. And three cost-reducing types of equipment are available as extras:

Automatic electric gage sizing with automatic compensation for wheel wear
Behind-the-wheel profile truing
Simple, effective flagging

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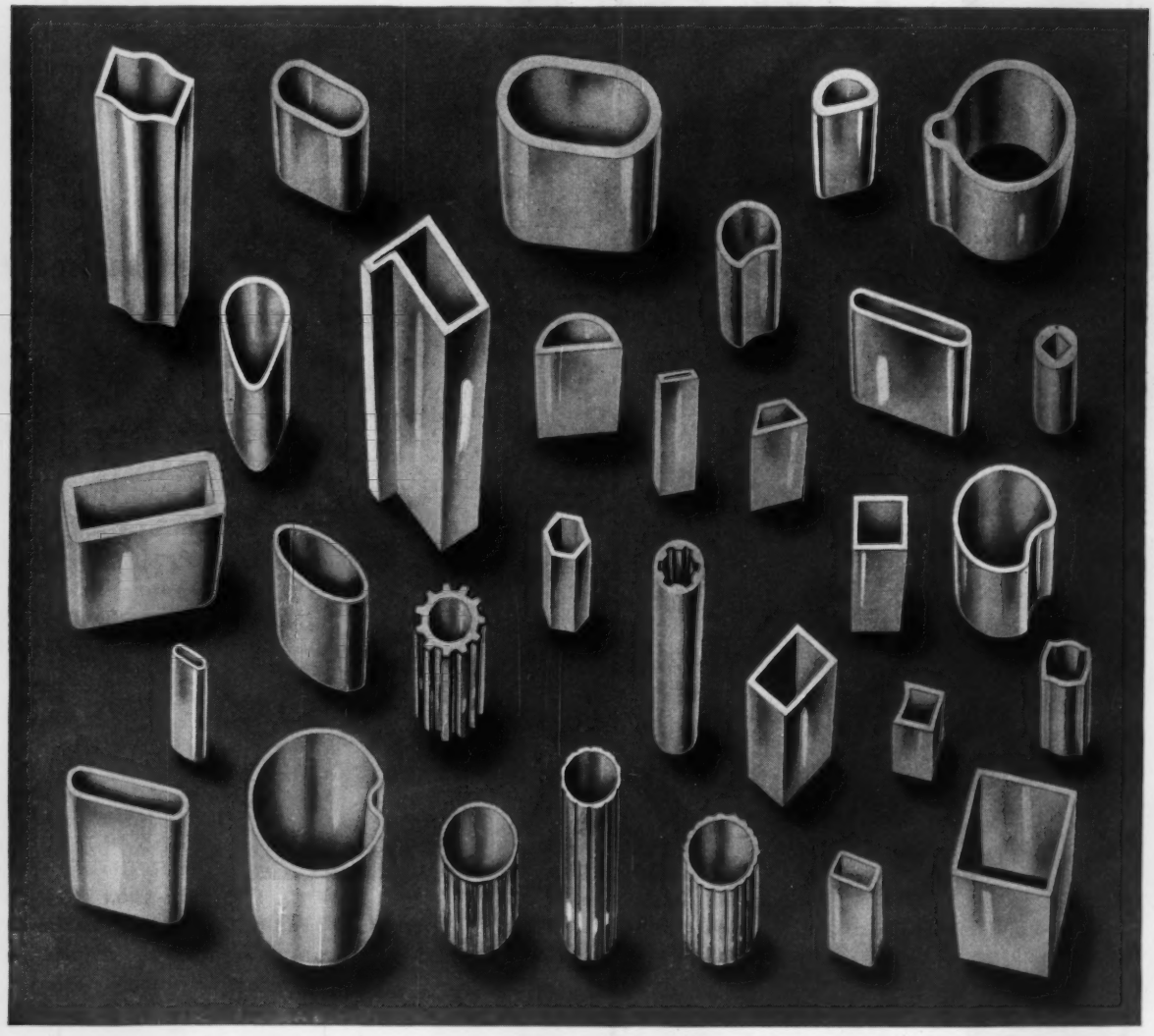
A SHORT CUT TO A FINISHED PRODUCT



YOU NAME THE TUBE SHAPE AND THE METAL

Our specialized facilities and stock tools can save you time and money

Special-shape seamless tubes in straight lengths, or cut into short pieces, can save several steps in arriving at a finished product—can save you material and many direct labor costs. The American Brass Company's French Small Tube Division has turned out thousands of tubes in special shapes up to ¾" O.D. A variety of stock tools is available to save fitting-up charges.

For consumer products: Some special tubes are produced to the accepted commercial tolerances and finishes for such applications as electric fixtures, furniture ferrules, heat exchangers, radiator tubes, refrigeration controls, hardware, jewelry, automatic pencils, and a host of others.

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Wide choice of metals: Special-shape tubes are available in copper, brass, bronze, nickel silver, special copper alloys, and aluminum — furnished in straight mill lengths or accurately cut to your specifications.

For action: See your American Brass Company representative or send in a sample, drawing, or description, together with the quantity you need, the metal, and other pertinent data. Address: The American Brass Company, French Small Tube Division, Waterbury 20, Conn.

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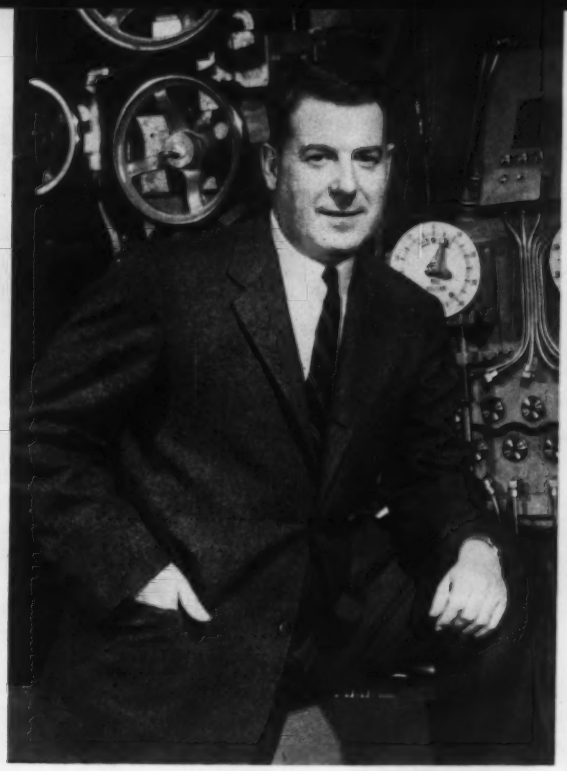


McKay's Wardle Builds Key Salesmen

HOW DO YOU build a team to sell specialized machines to diversified markets?

"Our answer," says A. Jay Wardle Jr., vice president of sales, McKay Machine Co., Youngstown, "is to develop key men to head up the sales efforts of each product group."

Mustang—"Key man" is an apt description of Jay Wardle himself. He started with McKay in 1935 as blueprint boy. When he transferred to sales in 1939, he had worked up through the ranks of the engineering department. Since then, he has made the auto industry his specialty, building up the market to account for 40 per cent of McKay's dollar volume.

Jay Wardle's sales team has five key men, handling steel, nonferrous, aircraft, auto and auto part industries. Each man's background is similar to his own. Though not all are graduate engineers, all have been through the engineering department mill and know their specialties inside out.

Service—"We maintain neither distributors nor district sales offices," says the sales vice president. "Instead, we use a company plane to fly our experts to their customers and to get them back fast, so that they can work hand in hand with engineering on individual needs. Our servicemen use the company plane, too. As far as we're concerned, service is a function of the sales department." This concept pays off. McKay's repeat business accounts for an unusually high percentage of sales.

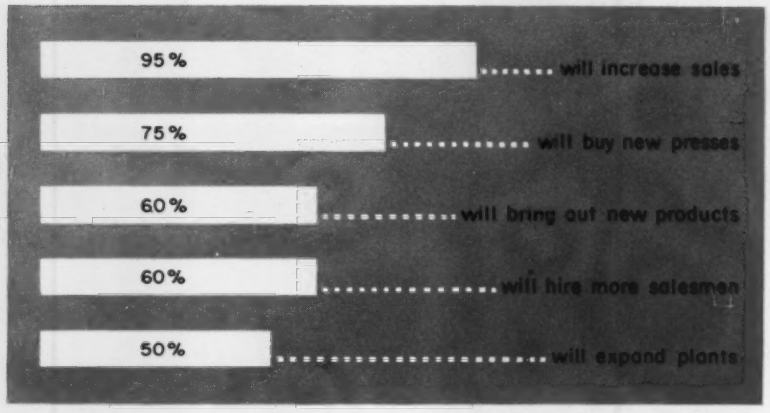
A good deal of Mr. Wardle's time is spent pondering the sales angles of further product diversification.

Development — New products, such as the tape-controlled drilling machine for the aircraft industry, may depart from McKay's standard line. Others, like a mechanical press feeder developed from electrically controlled ancestors, may just extend the line. It matters little. "Engineering may be able to make it," points out Jay Wardle. "The question is: Can we sell it?"

For this reason, McKay bets heavily on its key salesmen to evaluate customer inquiries. The sales vice president and his team are vital to the executive group that makes the final decision.

Off the job, Jay Wardle is a social golfer, shooting in the 90s. Fishing is his preferred sport. When he's not running his sales team, you'll find him either in Canada or at the Rod & Gun Club in Florida's Everglades.

What Stampers Expect in '56



Based on a survey by the Pressed Metal Institute

Stampers Keep Punching

Following a great year in 1955, competition for new business this year will be keen. The drop in auto production brings home the need for more diversified sales

STAMPERS will roll with the punch of lowered auto production in 1956 and counter with a sales increase of 5 to 10 per cent over last year.

Counterpunch — Diversification is the hook on which the stamping industry hangs its future. J. M. Ward, executive vice president, Heintz Mfg. Co., Philadelphia, explains his outlook for a 20-per-cent sales increase: "As a jobbing shop, we have actively sought orders from a cross section of industry to level out the peaks and valleys of producing for only one industry."

Rising sales are in order for both captive and job shops. From all indications, major industries are increasing their captive facilities, but there's still plenty of business for the job stamper.

Color TV—More sales to the electronics, controls and appliance industries are being registered. Production of 300,000 color television sets in 1956 may help the stamping sales of an eastern firm by 5 per cent. Another stamper has developed a universal tube shield which will boost his sales 50 per cent. New customers among automatic controls makers for a Detroit stamper will take up any slack caused by the drop in auto production.

John E. King, sales manager, Worcester Pressed Steel Co., Worcester, Mass., reports: "Our sales in the appliance field will increase 30 to 40 per cent in 1956."

The Detroit Story — In some cases, the drop in auto production walloped Detroit stampers with a 30-per-cent sales cut. However, most firms used the cutback as a chance to catch their breath, and the bell already is ringing for the next round as confirmations of orders from the auto companies begin to pick up for April and May.

One result of the auto situation may be keener competition among stampers in the electronics and appliance fields. For example, New England stampers weren't much affected by the cutback, but they are feeling competition from midwestern stampers who want to diversify into their fields.

Personalized — Following the job stampers' theory that the large manufacturer can't handle the specialized problems of stamping with the same efficiency as the job shop, more attention will be given this year to close personal contact between stamper and customer. E. J. Klaunberg, vice president, Charles T. Brandt Inc., Baltimore, thinks more personal contact will be at least partly responsible for a 15-per-cent sales increase in 1956.

Additional business will go to the job shops from captives who can't take care of all their work. More work will be farmed out in Detroit by the third quarter when the captives are loaded with '57 auto production.

Price Cutting—Rising costs of steel and copper are narrowing the profit picture for the stamper. One executive says repricing alone has kept him busy the last six months.

Competition between job stampers is particularly tough in some areas. C. C. Caditz, president, Northern Metal Products Co., Franklin Park, Ill., reports that "each quotation is a struggle." Most firms are more aware of their costs than they were a few years ago. Price cutting activity that does go on usually is sporadic and temporary.

New Products—Research is paying off for many stampers. Craft Mfg. Co., Chicago, has developed a new milk cooling system with which it expects to double its sales this year.

Costs are being cut, too. An eastern stamper is installing uncoiling and cutoff facilities so it can purchase steel in coils.

Preparation — Stampers have confidence in the years ahead. Advance Stamping Co., Detroit, will move into a new 43,000-sq-ft plant this fall, occupying about two-thirds of it with present equipment, and leaving one-third free for expansion.

According to Harold A. Daschner, managing director, Pressed Metal Institute, Cleveland, 1956 is a year of expansion for his members (see chart): "Their expansion plans are sound and in keeping with good business practices." Mr. Daschner concludes that by 1960 one of five PMI members will have increased his production area by 40 per cent or more.

Rotor goes into a 37,500-kw generator for Caracas, Venezuela

General Electric expects shipments to hit new high as . . .

U.S. Power Goes Abroad

GENERAL ELECTRIC CO., Schenectady, N. Y., will boost export shipments of steam turbine generators to a record this year. Total capacity will be almost 650,000 kilowatts, enough to satisfy the electrical needs of 9 million people for a year.

Spain will get more than 300,000 kilowatts, chiefly for a new power plant being built on the Mediterranean coast near Cartagena. The new units will supplement hydroelectric installations to give year-round service despite drouth. Steel, aluminum and copper industries will draw big dividends. The power station will be one of Europe's biggest. Spain is to get an additional 62,500-kw unit near Bilbao to power heavy machinery and steel industry expansion.

Other Turbine division exports will go to Japan, the Near East, Venezuela, Mexico, Chile, Ecuador, Colombia, Cuba, the Dominican Republic, Jamaica and Puerto Rico. GE is making the equipment in Schenectady and in Lynn and Fitchburg, Mass.

Russia Tells Atom Plans

Russia revealed her atomic energy plans this month at a meeting of the United Nations Economic Commission for Asia and the Far East.

Said Nikolai M. Chuprakov: "We are building 2000-kw experimental reactors for Poland, Czechoslovakia, Rumania, Hungary, Bulgaria and East Germany, also a 6500-kw reactor for the Chinese People's Republic. Czechoslovakia will have a large atomic plant within the next five years. By 1970, she will produce more than 20 billion kw-hr of atomic power."

The UN estimates that it may be ten years before atomic power can compete with conventional generating methods in Asia. But at least one of the affected countries, Japan, says it will need a new source urgently before 1965.

Meanwhile, the Atomic Energy Commission, Washington, announces it will sell 129 tons of heavy water to six foreign nations for use in their peacetime atomic development programs. Included are the U. K., France, India, Australia, Italy and Switzerland.

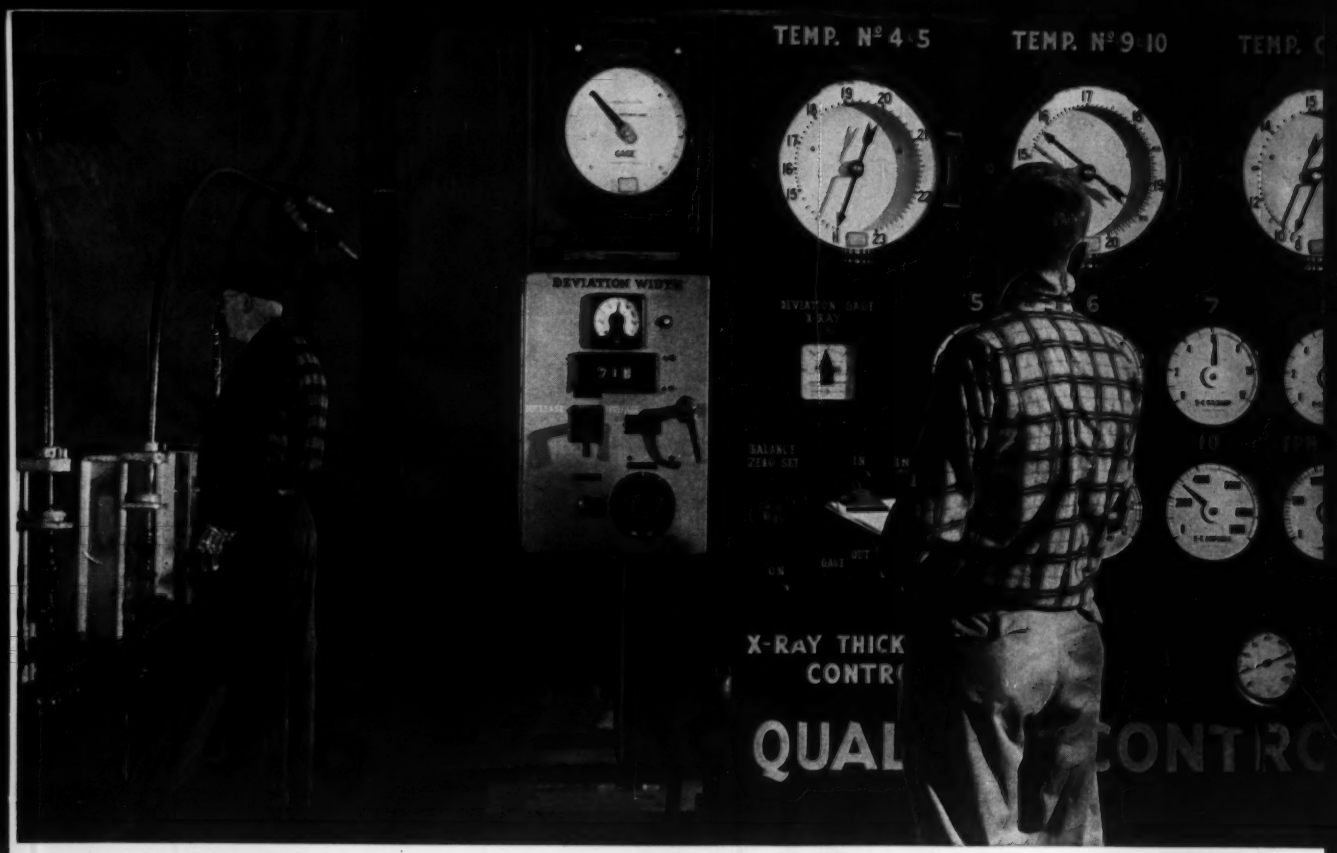
Trade Notes

Japanese industrialists are getting set for heavy investment in metalworking around Sao Paulo, Brazil. Most-mentioned projects: Cotton mills, an auto plant, a steel mill, cement and shipyards. Other projects also are in the wind for the coastal region.

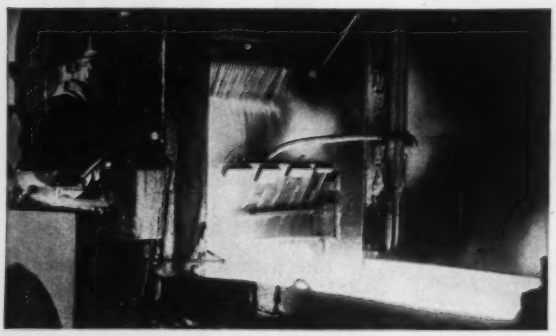
German fabricating industries are looking at automation with renewed interest. Reason: New pressure from labor for higher wages and shorter work week. Volkswagen, for example, plans to switch to a 40-hour week soon, must cut labor costs to retain its competitive edge in world markets. And German tractor makers are taking a beating overseas, where they must compete with plants like Ferguson in England, which has automated its production and still enjoys lower labor costs than U. S. manufacturers.

Europe's Steel Squeeze

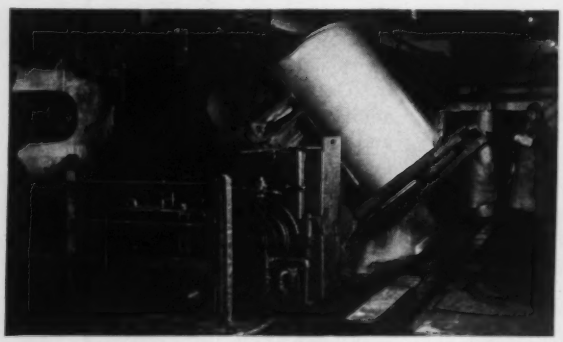
In line with a seasonal demand slump compounded by the effects of the latest credit squeeze, British automakers are cutting back production sharply. It's expected that demand for steel will not be off much as a result. New business for most products carries delivery dates up to six months . . . In Germany, despite continuing additions to rolling capacity, sheet and rolled products order backlogs still are piling up. There's full employment in auto, machinery and construction; shipyards are booked solid to 1960 . . . Belgium's steel mills also are operating at capacity. Demand is strongest for plates, structural steel and merchant steel.



How Great Lakes Steel *guides* quality



FIRST QUALITY CHECK is made at No. 1 Mill Stand. Here, an electronic pyrometer relays the strip's temperature to the panel.



FINAL CHECK in this operation is made at the coiler. From slab to coil, the control panel spells far better quality.

Here's one of several electronic operation panels that take the guesswork out of quality control at Great Lakes. You'll find this one guiding the entire operation of the 96-inch continuous mill.

As the red-hot strip races from roll stand to roll stand and on to the coiler, the temperature, speed, width and thickness of the strip *at each stage* are instantly shown on the panel.

A glance at the panel tells the operator if any adjustments are necessary to assure a finished product of the highest quality—a product that will stand the rigid test of your specifications.

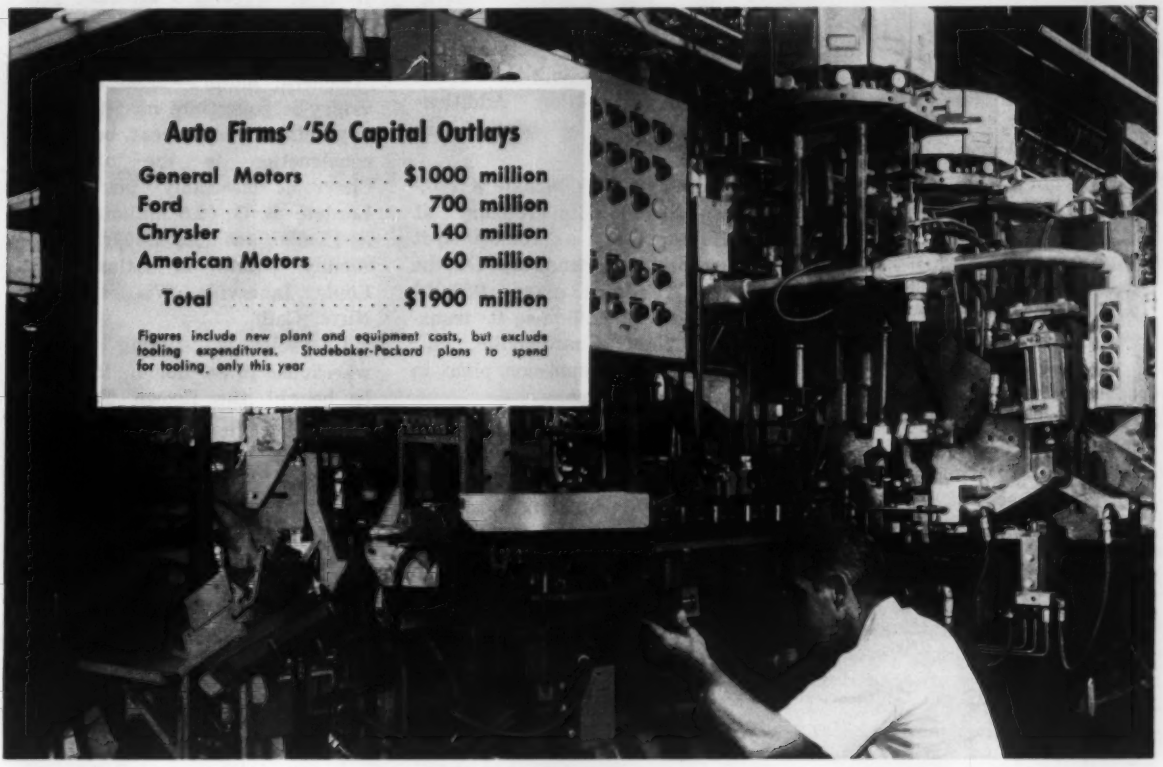
This is further proof that Great Lakes has what it takes—the experience and the very latest equipment—to make your product even better. Our representative is just one telephone call away.

GREAT LAKES STEEL CORPORATION

Ecorse, Detroit 29, Michigan • A Unit of

NATIONAL STEEL CORPORATION

District Sales Offices: Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.


Auto Firms' '56 Capital Outlays
General Motors ..... $1000 million
Ford ..... 700 million
Chrysler ..... 140 million
American Motors ..... 60 million
Total ..... $1900 million
Figures include new plant and equipment costs, but exclude tooling expenditures. Studebaker-Packard plans to spend for tooling only this year

GM men put together an automatic assembly machine for rear wheel bearings

Auto Men Spend $1.9 Billion

Present production capacity is about 6 million cars annually on a 40-hour-a-week rate. When current expansions are finished, straight-time potential will approach 7 million

AUTOMOBILE companies will spend $1.9 billion for capital goods expansion in 1956, says the Commerce department. Almost half this amount will be for additional plant area.

Automakers have 24.6 million sq ft under construction. Most of it will be finished this year and in the early part of 1957.

Ford Adds—Biggest builder is Ford Motor Co. which has 17.5 million sq ft going up. It's estimated that 12 million sq ft will be for manufacturing area; the rest is going into office, engineering and warehouse space.

General Motors Corp. is in the process of adding 3.5 million sq ft to its over-all plant capacity. Although GM is putting in less manufacturing area than Ford, it is spending more for equipment and tooling.

New Equipment—An estimated two-thirds of the $1 billion Harlow Curtice says will be used for GM's 1956 expansion is going into new and replacement equipment. Ford is spending a little more than $500 million on construction alone. Possibly $200 million will be for additional equipment.

Chrysler Corp. is adding 3.6 million sq ft of plant space this year. Cost will be in the neighborhood of $140 million. This is a small part of the $1 billion Chrysler President L. L. Colbert has stated will go into capital goods expansion by 1960.

Little Two—Neither American Motors nor Studebaker-Packard has announced major plant expansions. This year, AMC is spending most of the $60 million (see table) for product development and equipment modifications. Engineering and tooling for the company's V-8 engine took $11 million out of this sum.

Studebaker-Packard, faced with a gloomy sales picture, is putting its money on 1957 models which will include an addition to the Packard line. Public reception to the coming cars may determine what the company will do in the next year or two.

Theories—Two aims stand out in the current rash of automotive expansions. One is to balance production capacities; the second is to boost over-all output without

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having to go into overtime or double shifts.

Like most big assembly operations, automakers are faced with the continual problem of maintaining a balanced flow of parts to final assembly points. V-8 blocks are piled up in Ford's foundry because engine plants can't handle them. In such situations, storage and maintaining parts production become a real crick in the neck.

The reverse is equally vexing. A Dodge assembly plant in Detroit recently had to lay off its workers for several days because the line was stalled by a scarity of minor parts.

Overtime—The industry turned out 7.9 million cars last year, but it took overtime and double shifts to do it. Carbuilders would like to be able to make that many cars on a straight-time basis.

It's estimated that total annual car capacity on a 40-hour-a-week rate is about 6 million. When current expansions are finished, straight-time capacity should be pretty close to the 7-million mark.

Buick is an example. Its market has increased from 555,000 in 1950 to 750,000. Last year, the division announced plans to boost capacity from 750,000 to 1 million cars a year. It turned out 781,000 automobiles in 1955 by working at top overtime capacity.

With balanced production and some increase in capacity, Buick probably can make about 750,000 cars this year without going into expensive overtime. If demand is great enough, the division still can put on an extra shift.

Growth—The boom in population and family formations, plus a steadily rising gross national product, make it quite possible that 8-million-car years will not be uncommon by 1965. Ralph J. Cordiner, General Electric Co. president, goes farther. He says: "In the early 1960s, production of 10 million cars a year can well be the way of life in the automotive industry." Automakers themselves aren't quite that optimistic, but do admit that annual production quotas of 7 and 8 million are quite possible by 1960.

A rundown on current construction will show what companies are doing.

Ford—Since Jan. 1, 1946, Ford has spent $1.7 billion to modernize and expand its plants. When currently planned projects are finished, the company will have spent more than $3.8 billion. Additional floor space will be about 50 million sq ft.

Current projects include a 250,000-sq-ft aluminum foundry at Sheffield, Ala.; a 750,000-sq-ft parts plant near Sandusky, O.; the Lima, O., engine plant (950,000 sq ft); a 1.7-million-sq-ft transmission plant, Sharonsville, Pa.; and another transmission plant in the Cincinnati area.

Mercury division recently announced its station wagon body assembly plant at Wayne, Mich. The division also is building a 1.4 million-sq-ft assembly plant in Rosemead, Calif. The Lincoln division plans to complete its general offices and assembly plant (1.5 million sq ft) by early '57.

Other construction to be finished this year and next includes two Dearborn, Mich., office buildings; a 4000-acre vehicle testing area near Romeo, Mich.; eight engineering buildings; a chassis parts plant north of Detroit; a 1 million-sq-ft glass plant, Nashville, Tenn.; a stamping plant near Chicago; a parts plant outside Ypsilanti, Mich.; and a steering gear and cold heading plant, Indianapolis.

General Motors—Most of GM's money is going into modernization of plants and equipment, but under construction is the mammoth Chevrolet assembly plant near Lordstown, O. (2.5 million sq ft); and additions to Chevrolet assembly plants in Atlanta, St. Louis, Janesville, Wis., and Van Nuys, Calif.

Chevrolet is building a parts warehouse in St. Louis. It recently bought the Brown Transmission Co. plant in Toledo, O., and is expanding its truck plant at Willow Run, Mich.

Pontiac division is enlarging its main assembly plant to provide space for a sheet metal "flow coat" priming system. It will put in two electric furnaces at its foundry. Both it and AC Spark Plug Division, Flint, Mich., are building waste disposal plants.

Oldsmobile, Cadillac, Buick and the Truck & Coach divisions have just about finished their projects and are putting this year's dollars into modernizing equipment to balance out production lines.

Chrysler—The corporation's biggest project under way is the 1.5 million-sq-ft body stamping plant at Twinsburg, O. It's figured that the $85-million job will be finished in early spring of 1957.

Meanwhile, Chrysler has just completed the Kokomo, Ind., transmission plant (800,000 sq ft) and is reconverting its Newark, Del., tank plant for assembly of Plymouth cars. Nonmanufacturing programs include expansion of the Central Engineering Division. Construction of a training center for sales personnel will get under way shortly in Detroit.

When these units are finished, Chrysler will have spent about $8.5 million on plants and facilities since 1946. Total floor space will be almost 40 million sq ft.

Be Prepared — This year and next should just about round out the current cycle of automotive expansions. L. L. Colbert has said: "Maybe, sometime, we will have a 10-million-car year." Automakers want to be ready.

U. S. Auto Output

Passenger Only

	1956	1955
January	611,190	659,508
February	554,667†	675,769
March		794,188
April		754,007
May		724,891
June		649,372
July		659,979
August		614,392
September		461,592
October		517,669
November		748,559
December		682,698
Total		7,933,369

Week Ended	1956	1955
Feb. 18	128,324	173,482
Feb. 25	125,502	171,188
Mar. 3	132,889	167,811
Mar. 10	132,840	171,346
Mar. 17	132,779†	176,194
Mar. 24	133,000*	178,068

Source: *Ward's Automotive Reports*
†Preliminary *Estimated by STEEL

ONE OF A SERIES . . .

What makes a cylindrical roller bearing good?

SUPERIOR QUALITY of INNER RACES

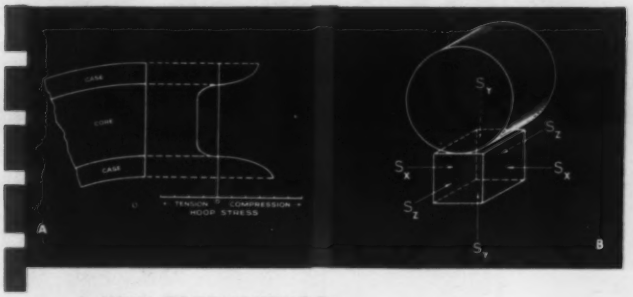
The function of an inner race is to provide a fatigue-resistant surface between a shaft and the bearing rollers. Because of roller bearing geometry, there is a smaller area of contact between inner race and rollers than between outer race and rollers. This concentrates more load on the inner race and makes it the critical member from a fatigue life standpoint, particularly when the inner race is the stationary member and maximum load is repeatedly applied at one point.

Since it is vital to good performance that the inner race does not work loose on the shaft, HYATT inner races are designed for relatively heavy press fits, so the inner race becomes an integral part of the shaft for all practical purposes. Other advantages of HYATT'S carburizing process and precision finishing operations are briefly explained at right.

You'll find more details in HYATT General Catalog No. 150, or your nearby HYATT Sales Engineer will gladly help you choose the type best suited to your design requirements. Remember, HYATT is America's *first* and *foremost* maker of roller bearings. Hyatt Bearings Division of General Motors Corporation, Harrison, New Jersey.

GM GENERAL MOTORS

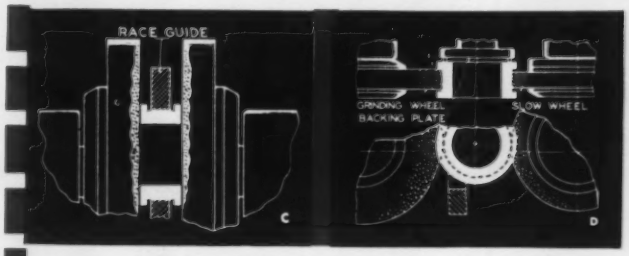
HYATT ROLLER BEARINGS



1. WHY CARBURIZING?

Carburizing provides inner races with tough cores, and flanges that will not crack, with no loss of case hardness. This permits tight press fits and also improves load-carrying capacity as shown in Diagram A. During quenching, a volumetric change tends to stretch the core and compress the case. Due to the Poisson effect, the compressive hoop stresses in the external fibres build up the load-carrying capacity.

Diagram B shows a typical element under roller load. Stresses in the "Z" direction are negligible; those in the "X" direction are compressive hoop stresses or pre-load. Those in the "Y" direction are compressive stresses due to the load. Without the compressive stress Sx (hoop stress) the load capacity would be reduced; and if "X" were a tensile stress due to pressing a through-hardened race on a shaft, the bearing capacity would be still less.

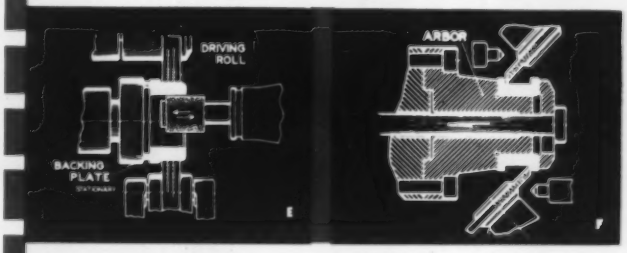


2. DOUBLE END GRIND

In grinding a HYATT inner race, the ends are first faced off square and parallel so they can be used as accurate reference during subsequent operations. The HYATT double end grind process (Diagram C) insures excellent control of parallelism.

3. CENTERLESS PATHWAY GRIND

Centerless grinding was pioneered by HYATT years ago, and eliminates excessive wall variation due to spindle and chucking errors. This method produces as nearly a perfect cylinder as is commercially practical. Two-point and three-point out of round and taper are held to a minimum. Note how work is rotated with backing plate against previously ground end (Diagram D) to insure accuracy.

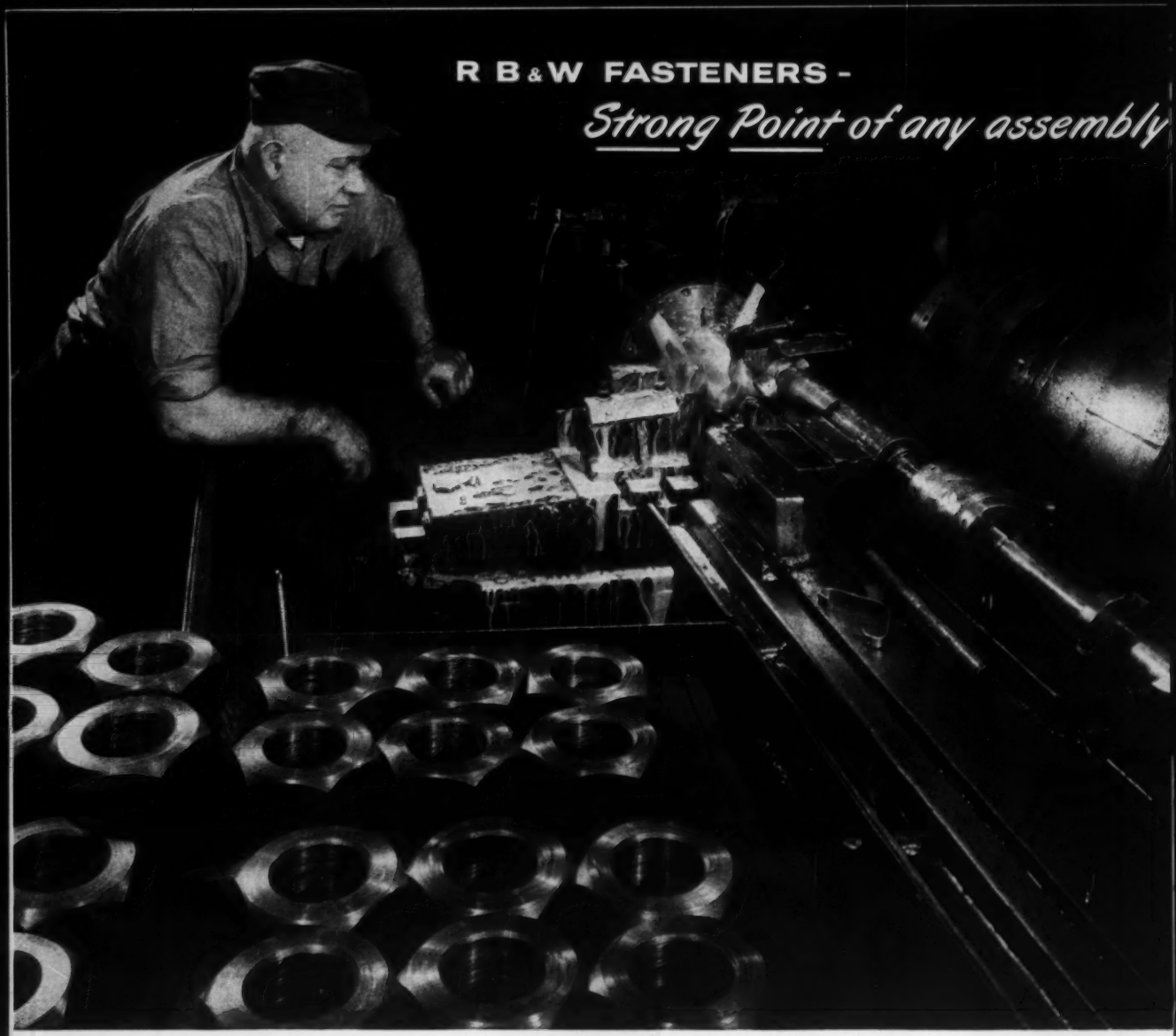


4. CHUCKLESS BORE GRIND

Here the centerless method assures a bore concentric with the pathway, with minimum wall variation, by removing stock from high spots as they pass between drive roll and related grinding wheel (Diagram E).

5. FLANGE GRINDING

To assure that they will run true with roller pathway, flange faces are also ground using the squared ends for reference (Diagram F). This establishes even contact with roller ends during bearing operation.


R B&W FASTENERS -
Strong Point of any assembly

Going to extremes to satisfy every need in fasteners

WHAT's the size-limit on nuts? Pretty high at RB&W, as you can see from the 4" giants above. At the other extreme, RB&W produces nuts down to 1/8". Everything in between, too.

Most are made on automatic nut formers. Big stuff gets milled from hex bars, and needs more personal attention. Frank Culko, long on skill and precision, is shown keeping his expert eye on the operation. Like so many other RB&W craftsmen, he's been with the company for well over 20 years.

There's plenty of production skill and experience, plenty of facilities behind the avalanche of nuts flowing from RB&W. In fact, it was RB&W that developed the first cold-punched-nut machine, the first continuous automatic nut tapper, and pioneered the cold forming process. Also a fact: RB&W recently invested millions of dollars in bolt and nut making equipment to expand capacity.

RB&W goes all out on quality control, too . . . with a program recognized as the finest of its kind.

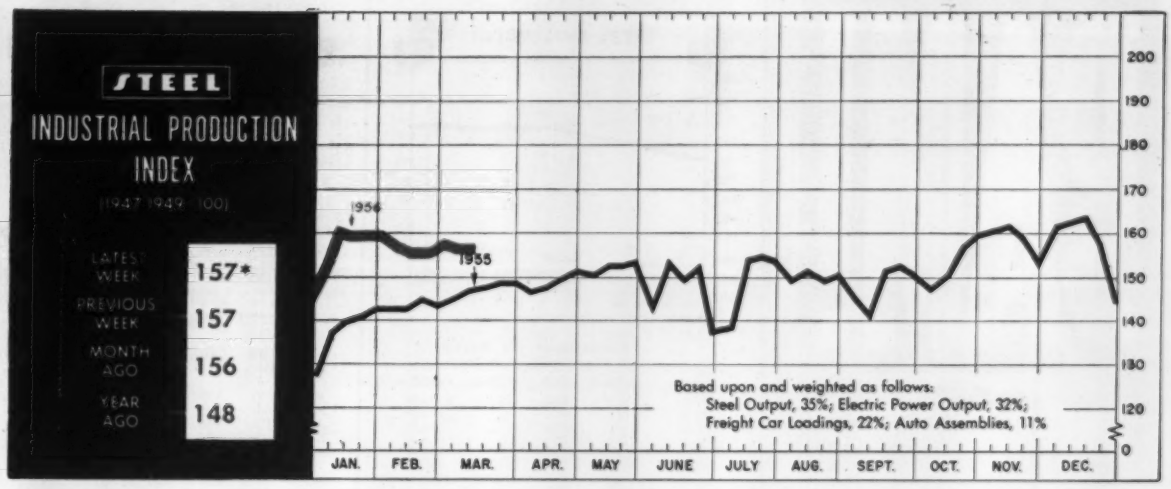
What does all this mean to *you?* More quality for your money. A truly reliable source of supply. Strong fasteners that never let you down.

Russell, Burdsall & Ward Bolt and Nut Co., Port Chester, N. Y.

RB&W

110th year

Plants at: Port Chester, N. Y., Coraopolis, Pa.; Rock Falls, Ill., Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; Seattle. **Distributors** from coast to coast.



*Week ended Mar. 17

Trend Lines Show Strength for 1956

ALMOST EVERYWHERE you look, signs point to a full year of hefty business on a level with the fourth quarter of 1955. Up to this time, businessmen have held off on predictions for the second half, but most trend lines in this quarter are unmistakably "steady as you go."

Take STEEL's industrial production index. With just two more weeks to go in the first quarter, the average weekly index is 157.6, compared with a 14-week average of 156.7 for the last quarter (1947-1949 = 100). It is true that the current period has not produced any one week as high as the record 164 for the week ended Dec. 17, 1955, but neither has it produce the low of 144 during a fourth-quarter week. In addition, the index has achieved its record despite the drop in automotive production, which was in its record-breaking spree late last year. Other segments of industry more than took up the slack.

Look Elsewhere—But don't just take our word for it. It has been said that as steel goes, so goes the nation. For the week ended Mar. 18, the industry set a weekly production record of 2,477,000 net tons for ingots and castings. This was 5000 tons better than the previous record set in the week ended Jan. 23.

Electric output continues to show strength. Edison Electric Institute records output of 11.133 billion kw-hr for the week ended Mar. 10. This marks the tenth straight week that the utility companies have passed the 11-billion mark.

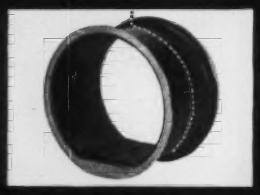
The railroads, too, are doing their share in upholding business confidence. The Association of American Railroads reports that for the week ended Mar. 10, loadings of revenue freight totaled 697,601 cars, or 5.3 per cent above the corresponding week last year. To keep up with this increased activity, the roads are continuing a heavy buying program. The Erie Railroad announces it will spend

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,446	2,477	2,262
Electric Power Distributed (million kw-hr)	11,200[1]	11,133	9,814
Bitum. Coal Output (1000 tons)	9,520[1]	9,880	8,404
Petroleum Production (daily avg—1000 bbl)	7,150[1]	7,162	6,858
Construction Volume (*ENR*—millions)	$648.9	$413.8	$374.8
Auto, Truck Output, U. S., Canada (*Ward's*)	168,949	165,304	212,776
TRADE			
Freight Car Loadings (1000 cars)	700[1]	698	656
Business Failures (Dun & Bradstreet)	270[1]	268	226
Currency in Circulation (millions)[3]	$30,276	$30,202	$29,801
Dept. Store Sales (changes from year ago)[3]	+7%	+6%	+11%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$20,702	$21,016	$21,975
Federal Gross Debt (billions)	$280.0[1]	$280.0	$277.8
Bond Volume, NYSE (millions)	$29.0	$25.6	$18.4
Stocks Sales, NYSE (thousands of shares)	15,428	14,178	14,528
Loans and Investments (billions)[4]	$84.3	$84.2	$84.2
U. S. Govt. Obligations Held (billions)[4]	$28.2	$28.3	$34.2
PRICES			
STEEL's Finished Steel Price Index[5]	209.10	209.10	194.53
STEEL's Nonferrous Metal Price Index[6]	286.0	277.5	227.3
All Commodities[7]	112.5	112.4	110.0
Commodities Other than Farm & Foods[7]	120.6	120.7	115.5

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

BAM!



AS 2 PIECES BECOME 1 – SAVE 43¢!

Raytheon asked PRESTEEL to draw electronic components to close tolerances in cupro-nickel. Thanks to our long experience, we succeeded.

We learned that two identical end rings were later brazed to form a single unit — at considerable expense and with many rejects.

"Why can't PRESTEEL make the unit as a single stamping?" we asked. Design surveys showed all kinds of problems. We still thought it could be done.

Our engineers designed a special set of dies. Result — a new **double** end ring at $3.07 per unit, a 43¢ saving! No brazing costs, no rejections.

Take **your** "pressing" problems to PRESTEEL — save! Send the coupon today.

Get a quote from the leader — PRESTEEL!

WORCESTER PRESSED STEEL COMPANY

704 Barber Ave., Worcester 6, Mass.
Please ask your representative to call ☐
Please send newest brochure ☐
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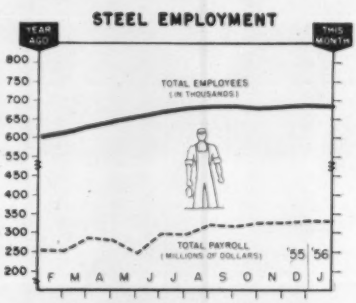
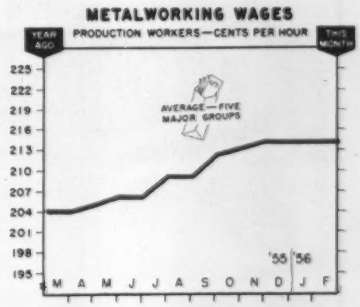
Title _____ Company _____
Street _____
City _____ Zone _____ State _____

THE BUSINESS TREND



	Employment in Thousands		Payroll in Millions	
	1956	1955	1956	1955
Jan.	681	605	$329.1	$258.8
Feb.	...	616	....	255.1
Mar.	...	630	....	288.2
Apr.	...	643	....	282.0
May	...	654	....	249.1
June	...	667	....	298.4
July	...	676	....	296.8
Aug.	...	680	....	320.7
Sept.	...	680	....	317.1
Oct.	...	678	....	325.1
Nov.	...	680	....	326.1
Dec.	...	682	....	330.6

American Iron & Steel Institute



1955	Prim. Mtls.	Fab. Prod.	Mach- inery	Elec. Mchy.	Trans. Equip.
Feb.	215	195	204	185	220
Mar.	216	195	205	185	221
Apr.	217	195	206	186	220
May	218	196	207	187	222
June	220	196	208	187	219
July	228	199	208	188	223
Aug.	227	199	209	187	224
Sept.	233	201	211	189	226
Oct.	231	202	213	190	228
Nov.	231	202	214	191	231
Dec.	232	203	216	192	228
1956					
Jan.	233	203	217	192	224
Feb.*	232	203	217	193	225

*Preliminary
U. S. Bureau of Labor Statistics

Charts copyrighted, 1956, STEEL

more than $22 million, about one-third more than the average of the last ten years. The Pennsylvania Railroad has placed orders for 79 diesel-electric locomotives costing about $16.5 million. Even though the flurry of new freight car orders is passed (fast amortization ran out at the end of 1955), the backlog of orders remained at a comfortable level of 114,437, on Mar. 1, reports the American Railway Car Institute. This will carry the car builders well through 1956 at a peak level of activity.

Appliance Maker Foresees Boom

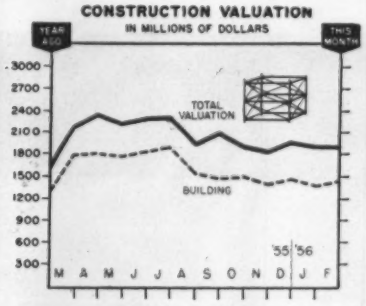
Appliance manufacturers, too, should be running at full blast this year, according to Ross D. Siragusa, president of Admiral Corp. He estimates that a minimum of 7 million black and white television sets will be sold this year. That will be followed by a record-breaking 10-million receivers sold in 1957.

Other appliances will share in this boom, Mr. Siragusa says. "We expect refrigerator sales in 1956 to increase at least 10 per cent over the 4 million that were sold last year. The trend is definitely up for freezer sales, and we anticipate the movement of approximately 1.2-million units, nearly 20 per cent more than a year ago. Electric range sales, which topped 1.6 million in 1955, should show a 10-per-cent increase this year and set an all-time record." Mr. Siragusa expects an annual market for 5-million color TV receivers and 6 million to 7 million black and white receivers in five years. He expects a proportionate increase for the major kitchen appliances.

Orders, Backlogs Stay Up

Industry is showing its confidence in several ways. First of all, it is planning record expenditures for new plant and equipment of $35 billion this year (see page 85). The Office of Business Economics of the Commerce department reports that manufacturers' new orders in January continued at a high level of $27.5 billion, or $3 billion more than in the corresponding period a year ago. A rise of $1.1 billion in backlogs brought the month-end total of unfilled orders to $56.6 billion. Even at near capacity operations, this assures the nation's manufacturers of continued good business for 1956.

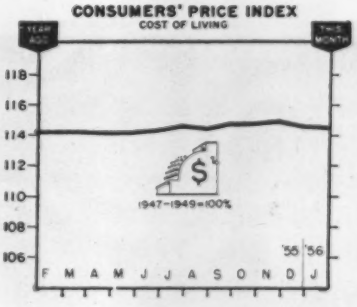
Add to all this the surprising reports from the construction industry, and you get a healthy indus-



37 States

	Total		Building	
	1956	1955	1956	1955
Jan.	1,858.2	1,504.5	1,355.7	1,255.1
Feb.	1,859.7	1,581.1	1,429.3	1,278.6
Mar.	.....	2,134.8	.....	1,748.6
Apr.	.....	2,322.1	.....	1,776.1
May	.....	2,185.1	.....	1,737.1
June	.....	2,255.2	.....	1,793.7
July	.....	2,271.5	.....	1,851.6
Aug.	.....	1,894.8	.....	1,516.9
Sept.	.....	2,034.9	.....	1,442.2
Oct.	.....	1,862.7	.....	1,474.8
Nov.	.....	1,796.8	.....	1,388.3
Dec.	.....	1,920.8	.....	1,438.0
Tot.	.....	23,764.3	.....	18,701.0

F. W. Dodge Corp.



	1956	1955	1954
Jan.	114.6	114.3	115.2
Feb.	....	114.3	115.0
Mar.	....	114.3	114.8
Apr.	....	114.2	114.6
May	....	114.2	115.0
June	....	114.4	115.1
July	....	114.7	115.2
Aug.	....	114.5	115.0
Sept.	....	114.9	114.7
Oct.	....	114.9	114.5
Nov.	....	115.0	114.6
Dec.	....	114.7	114.3

U. S. Bureau of Labor Statistics

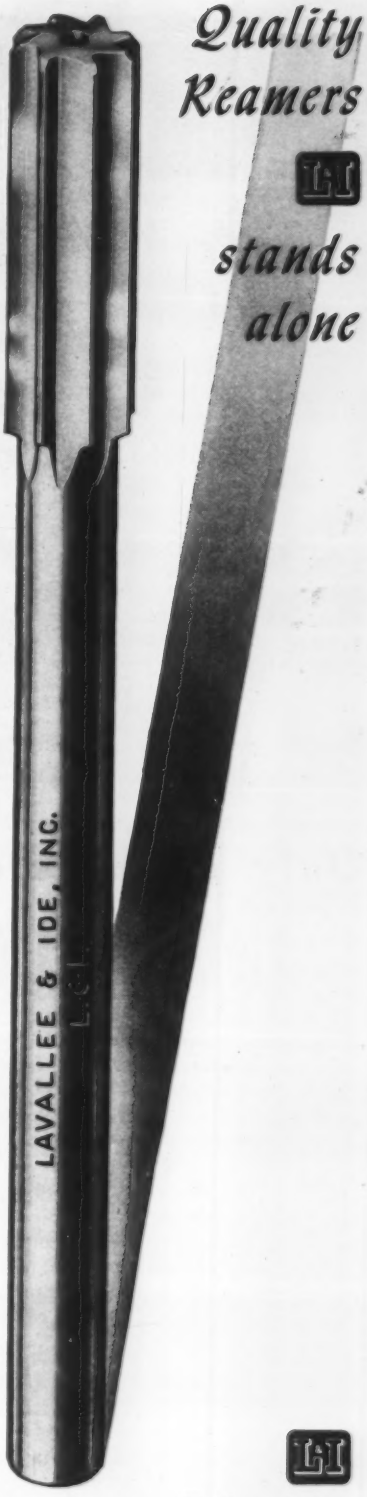
trial picture for 1956. *Engineering News-Record* reports contracts for heavy construction amounting to $648.9 million for the week ended Mar. 15. This is the biggest weekly volume since December, 1953. The cumulative total for the first 11 weeks of 1956 is running 37 per cent ahead of the corresponding period of last year.

Consumers Express Confidence

Perhaps the most encouraging sign of all is the confidence and optimism of consumers. Preliminary findings of the 1956 Survey of Consumer Finances conducted by the Board of Governors of the Federal Reserve System indicates they are just as confident of 1956 as they were of 1955. However, the report cautions that consumer plans to buy, expressed early in the year, should not be taken as a forecast of what they will buy during the year. Two-fifths of the consumers felt they were better off in early 1956 than at the beginning of 1955. And about the same number expect to be better off next year than they are now. Nearly two-thirds of those interviewed expect business conditions during this year to be good, while less than one-tenth expect them to be bad. These proportions are much more favorable than those for other years when this information was obtained by the survey. It is significant that self-employed businessmen showed the largest increase in favorable outlook, with three-fourths of those reporting expecting good times. About 8 per cent of the consumers interviewed in January and February expressed an intention to purchase a new automobile during 1956, while about 7 per cent indicated plans to purchase a used car.

Some of this consumer optimism apparently was turned into action in the automotive market during the first ten-day reporting period in March, according to *Ward's Automotive Reports*. The 21,720 daily rate was the best opening ten-day period since 23,800 sales were averaged daily last Sept. 1-10. It was 13 per cent over the corresponding period in February and only 5.5 per cent below a year ago.

The favorable sales picture in February and early March has resulted in a halt of the production cutbacks experienced during January and early February. U. S. production of passenger cars is holding steady at about 133,000 units a week. Production of trucks has been at the 24,000-unit level.



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The Reamer Specialists

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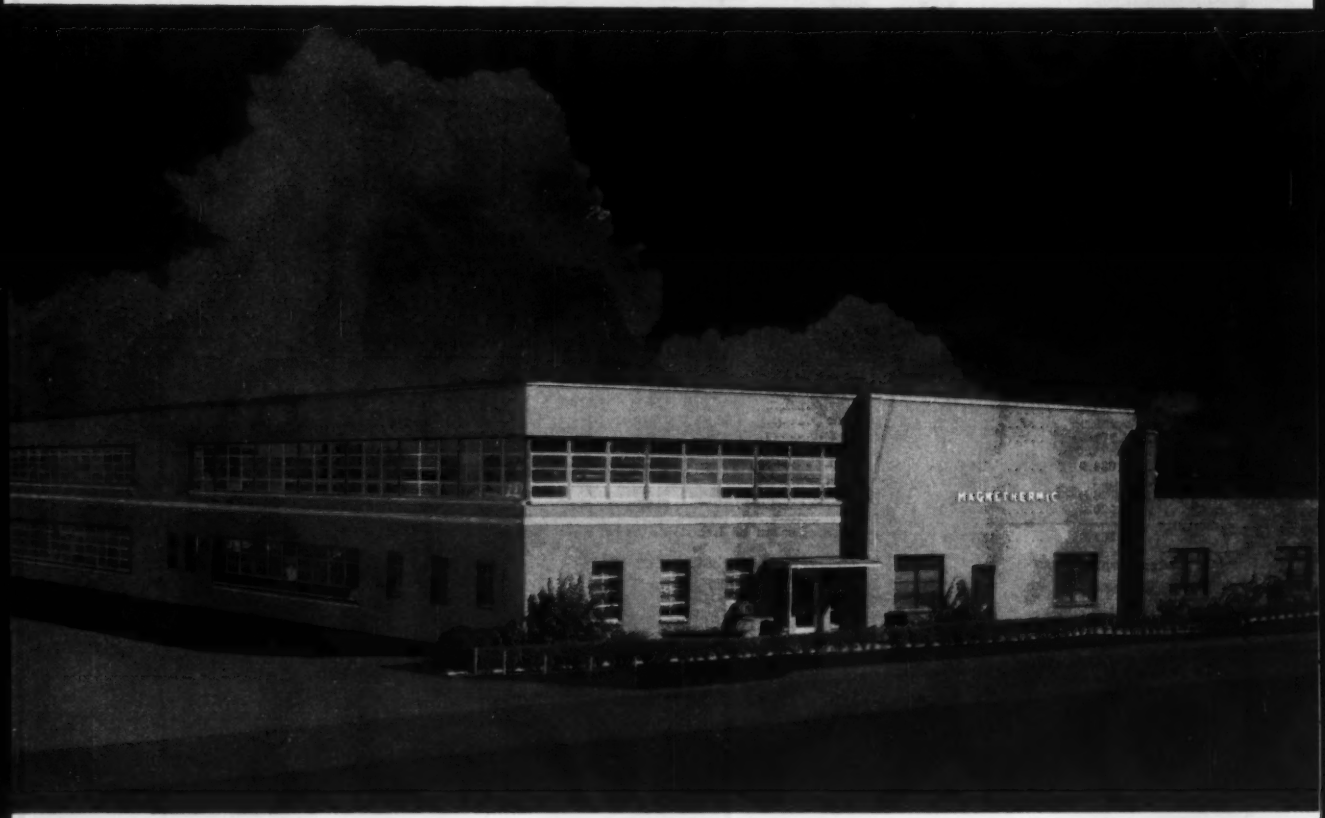


Only one interest here . . . Your Order For

INDUCTION HEATING EQUIPMENT

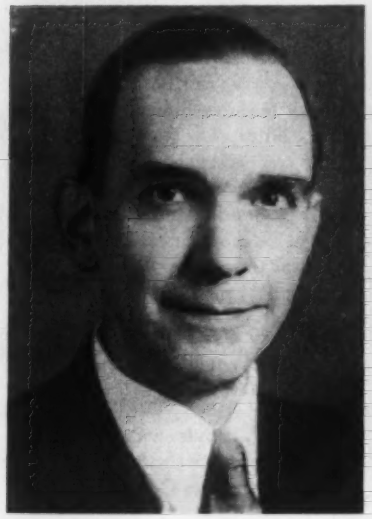
Is heating or heat-treating involved in your metal-working process?

If so, let a Magnethermic engineer review your operations and show you what induction heating can do for you.

For example, Magnethermic has designed high frequency equipment for continuous localized heat-treating of electric welded pipe. Another Magnethermic installation pre-heats 32″ diameter aluminum ingots, weighing 5,000 pounds, prior to extrusion.

Magnethermic's plant at Youngstown houses diversified facilities and specialized personnel devoting full time to induction heating, Low, Dual and High frequency.

Whether your inquiry concerns heat-treating, hot working or joining, Magnethermic can do the job. For specialized, intelligent attention, *place your inquiry with the specialist—Magnethermic.*



F. B. TANNEHILL
. . . Axelson Mfg. chief industrial eng.

F. B. Tannehill was made chief industrial engineer, **Axelson Mfg. Co.**, division of U. S. Industries Inc., Los Angeles. He was supervisor of methods engineering at Automatic Electric Co., Chicago.

W. E. Brainard was appointed chief engineer of the aircraft machine tool division of **Kearney & Trecker Corp.**, Milwaukee. He had been assistant to the vice president of manufacturing and manager of research and advanced planning at Hughes Aircraft Co. **John P. Bunce** was made assistant works manager for manufacturing operations at the W. National avenue plant.

Stephen L. Ingersoll was elected president and general manager of **Ingersoll Steel Division**, Borg-Warner Corp., New Castle, Ind. He was executive vice president. **H. G. Ingersoll**, who served for the last five years as president of the division, is a vice president of Borg-Warner.

William H. Haag was elected president, **Perfection Industries Division**, Hupp Corp., Cleveland. He succeeds **Donald S. Smith** who continues as a Hupp vice president.

Gerald R. Bond was named sales manager, production equipment, for **National Supply Co.**, Pittsburgh. He succeeds **Thomas B. Herndon**, recently promoted to manager of oil field sales.

B. W. BOGAN
. . . executive engineer at Dodge

B. W. Bogan was named to the new post of executive engineer of **Dodge Division**, Chrysler Corp., Detroit. Now responsible for all car and truck engineering activities, he was chief engineer.

Willard R. Schurene was appointed director of purchases for the Dayton, O., division of **Standard-Thomson Corp.** He was vice president-sales at Royal Electric Co.

Harry C. Daugh was made chief industrial engineer at **Mather Spring Co.**, Toledo, O.

Diversey Corp., Chicago, promoted **Dr. Neil W. Berst** to director of research laboratories.

James J. Munns advanced from senior vice president to executive vice president of **National Steel Corp.**, Pittsburgh. He was in charge of over-all direction of research and quality control in company divisions. **Daniel H. Dellinger** was made assistant vice president in charge of quality control.

Thomas M. Butler fills the new post of director of engineering for **Burroughs Corp.**, Detroit. He has served as chief development engineer since 1945.

Frank G. Hickey Jr. was named general sales manager, **Tait Mfg. Co.**, Dayton, O. He succeeds **Paul S. Nix**, resigned.

ROLAND LEHR
. . . Baker Bros. president-gen. mgr.

Roland Lehr was elected president and general manager of **Baker Bros. Inc.**, Toledo, O. **A. L. Baker** was named chairman. Mr. Lehr previously was sales manager of Quincy Compressor Co.

Arthur S. Nippes was made assistant general manager in charge of manufacturing for **Henry Disston Division**, H. K. Porter Company Inc., Philadelphia. He was works manager, Elliott Co.

Frederic A. Celler was elected vice president-sales, **Brewer-Titchener Corp.**, Cortland, N. Y. He was general sales manager.

Dr. Herbert Trotter Jr. was made vice president of engineering and research for **Sharples Corp.**, Philadelphia.

Fabricated Steel Service Inc., North Hollywood, Calif., appointed **Edwin M. Waite** vice president and **Edward Sullivan** manager, aircraft and handling division.

William J. Sweeney was made regional sales manager, Pacific region, for **Behr-Manning**, division of Norton Co. **Fredrick D. Stevens** becomes industrial sales manager, Los Angeles division. Mr. Sweeney succeeds **Paul S. Wiswell** who retires Mar. 31.

William E. Wilson succeeds **James A. Comstock** as president of **Acme**

RAY W. HEIDEN

RONALD L. LOUP

. . . Progressive Welder Sales Co. appointments

Electric Corp., Cuba, N. Y. Mr. Comstock is now chairman of the board.

Fred L. Schwab was named general sales manager and **Stanley McClean** works manager at Phillips Control Corp., Joliet, Ill. Mr. Schwab was in charge of eastern division sales at New York. Mr. McClean, formerly comptroller and assistant secretary-treasurer, will direct production activities of the two Joliet plants and the Puerto Rico plant.

Edward C. Cooney joined the metal division of **New Jersey Zinc Sales Co.** at New York.

Leonard Eller was made assistant superintendent of **Lone Star Steel Co.'s** electric weld pipe mills, Lone Star, Tex.

Paul Bigby was made Detroit district sales manager, mechanical goods division, **United States Rubber Co.**

Osborn Mfg. Co. established four new sales districts and named these district managers: **G. B. Pecsok**, eastern district, New York; **P. A. Malling**, western district, Los Angeles; **J. H. McGinnis**, Detroit district; and **C. William Newman**, east-central district, Cleveland.

Milton Forman was appointed vice president, **Alpha Tank Co. Inc.**, Long Island City, N. Y. He heads production, research and development.

Progressive Welder Sales Co., Detroit, appointed **Ray W. Heiden** director of manufacturing and **Ronald L. Loup** director of engineering.

Flexonics Corp., Maywood, Ill., elected **Howard W. Griesbach** vice president in charge of aircraft and bellows manufacturing. **Frank J. Rupp** was made sales manager, bellows division, succeeding **Mr. Griesbach.**

David F. Upton and **Leonard J. Hardke** were named purchasing agents to head separate components buying and expediting sections in the purchasing department of St. Joseph Division, **Whirlpool-Seeger Corp.**, St. Joseph, Mich.

Dr. Dillon Evers, former associate professor of metallurgical engineering at Purdue University, joined **Mallory-Sharon Titanium Corp.**, Niles, O., as associate director of research. **Herbert M. Lundstrom** was made service engineer. **Leland W. Long** was appointed sales engineer for commercial market development of titanium mill products.

Clark Grey was made general sales manager, **Avnet Electronic Supply Co. Inc.**, New York.

Charles W. Boyle was made Philadelphia district manager for **Plasteel Products Corp.**

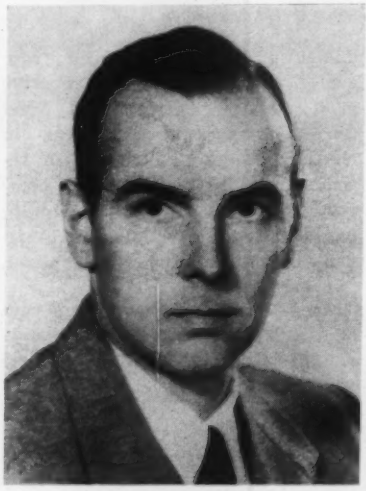
Joslyn Mfg. & Supply Co., Chicago, appointed **Roger W. Kiley** assistant sales manager, stainless steels division.

Robert P. White was elected vice president-sales, **White Cap Co.**, Chicago.

William O. Bruce was made manager, railway sales department, **Orton Crane & Shovel Co.**, Chicago.

James P. Malmstrom was made general manager of **United Aircraft Products Inc.**, Dayton, O. He was manager of defense product sales with Standard-Thomson Corp.

Theodore C. Norris was made assistant sales manager, **American**



DAVID F. UPTON

LEONARD J. HARDKE

. . . Whirlpool-Seeger purchasing agent posts

Customer's Report

"Single stack flexibility makes batch annealing approach continuous operation"

The flexibility found in the Lee Wilson Single Stack furnace has enabled users to save thousands of dollars annually. As one customer puts it: "by getting each pedestal under heat as soon as it is loaded we are able to achieve a continuity of material flow through the department which has enabled us to make more efficient use of labor, and record the best labor-production ratio in our annealing history." Others point out that the Single Stack permits unparalleled freedom of movement to meet any annealing requirement, such as the grouping of like diameter coils for increased efficiency, and giving immediate attention to any small orders of special analysis metal.

Remember this flexibility when you are considering annealing . . . and talk with Wilson sales engineers about the nation's most popular furnace — the Lee Wilson High Convection Single Stack.

9921

Only Lee Wilson Furnaces Give You All These Advantages

1. GREATER FLEXIBILITY
2. MORE UNIFORM HEAT APPLICATION
3. IMPROVED CUSTOMER SERVICE
4. HIGHER PRODUCTION
5. BETTER LOAD FACTOR
6. MINIMUM PROCESS INVENTORY
7. REDUCED LABOR COST
8. BETTER OPERATING CONDITIONS
9. LOWER MAINTENANCE COST
10. REDUCED INSTALLATION COSTS

Lee Wilson* **ENGINEERING COMPANY, INC.**

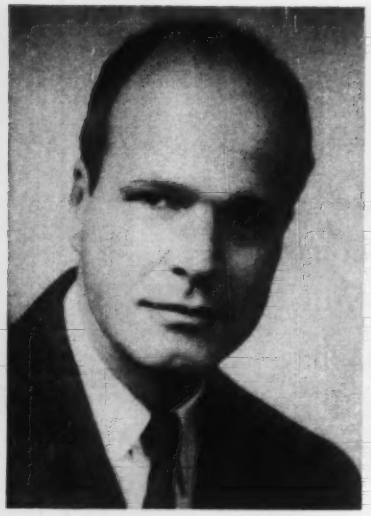
20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

SINGLE-STACK RADIANT TUBE ANNEALING FURNACES

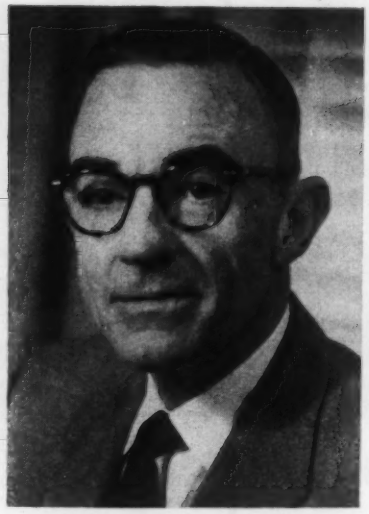
MAKE THE BEST METALS BETTER

* ORIGINATORS AND LEADING PRODUCERS OF SINGLE-STACK RADIANT TUBE FURNACES

The trend is to single stack, one of the nation's largest annealing departments recently set into operation 24 Lee Wilson Single Stack Furnaces and 72 bases.



DR. MILES V. HAYES
. . . joins Jones & Lamson Machine Co.



RICHARD F. GIBBONS
. . . heads Gardner Transformer Div.

JOHN A. RADO
. . . Diamond Power engineering post

Steel & Wire Division, U. S. Steel Corp., Cleveland.

Jones & Lamson Machine Co., Springfield, Vt., appointed **Dr. Miles V. Hayes** to its staff for long range development studies. He was head of United Aircraft Co.'s helicopter section, research department.

Robert M. Fichter was made manager, product development department, television-radio division, **Westinghouse Electric Corp.**, at Metuchen, N. J.

Stanley R. O'Dette was made manager, petroleum engineering division, **Alsop Engineering Corp.**, Milldale, Conn., He will serve as technical adviser and sales director for all power plant applications, as well as all industrial oil problems.

Edward T. Ragsdale was made general manager of **Buick Motor Division**, General Motors Corp., Detroit. He succeeds **Ivan L. Wiles**, now an executive vice president of GM.

Richard F. Gibbons was made general manager, **Gardner Transformer Division**, Federal Pacific Electric Co., at Emeryville, Calif. He was manager of air switchgear engineering of the Pacific Switchgear Division.

Dan W. Oram was made executive director of sales by **Klemp Metal Grating Corp.**, Chicago. He was associated with Kerrigan Iron Works Inc. as head of its market development division.

A. M. Castle & Co., Chicago, appointed **David R. Hughes** manager of aircraft sales.

James E. Patas fills the new post of director of merchandising at **Charles Bruning Co. Inc.**, Chicago.

M. C. Irani was made vice president of research and development of the metals chloride division of **Salem-Brosius Inc.**, Pittsburgh.

Fred H. Reed, general manager, **United States Chemical Milling Corp.**, Culver City, Calif., was appointed assistant to the president.

John A. Rado was made chief engineer, electronics department, **Diamond Power Specialty Corp.**, Lancaster, O. He was assistant chief engineer with Telechrome Mfg. Corp.

Henry A. Oldenkamp joined **Food Machinery & Chemical Corp.**, San Jose, Calif., as manager of central engineering. He has been with American Machine & Foundry Co. for the last eight years and in 1953 was made director of its general engineering laboratories at Greenwich, Conn.

John D. Fess was made Pittsburgh district manager, **Okonite Co.** He formerly was northwest manager at Portland, Oreg., and is replaced by **James B. Caldwell. Edwin R. Conklin** becomes branch manager at Seattle.

Cleaver-Brooks Co., Milwaukee, appointed **Robert E. Sullivan** supervisor of a new department formed to handle sales of commercial heating boilers. Mr. Sullivan was with Mt. Hawley Mfg. Co. as vice president-sales.

OBITUARIES . . .

Louis R. Seiton, 62, founder and president, **Standard Metals Co.**, Detroit, died Mar. 7.

Burns H. Dreese, 58, vice president-general manager, **Hobart Mfg. Co.**, Troy, O., died Mar. 5.

Walter W. Gordon, 73, former production manager, **Worthington Corp.**, Buffalo, died Mar. 8. He retired a year ago.

C. Goodwin Bradley, 54, former vice president, secretary-treasurer, **C. C. Bradley & Son**, Syracuse, N. Y., died Mar. 9.

Alonzo G. Decker, 72, chairman and president of **Black & Decker Mfg. Co.**, Towson, Md., died Mar. 18.

Fred E. Leeming, Los Angeles district sales manager, **Superior Steel Corp.**, died Mar. 12.

New Kearney & Trecker's "Bull's-Eye" Control Grouping

Available under Tool-Lease program

TF Series milling machine's controls are conveniently grouped up-front where they belong to assure accurate settings ...measurably reduce operator fatigue

ONE look tells why the new TF Series milling machines — Plain, Universal and Vertical — are so easy to operate. "Bull's-eye" up-front control grouping permits operators to achieve exact settings faster, more adeptly and with greater ease than ever before. This "Fron-Trol" convenience is the key to low-cost production . . . because it increases the operator's efficiency and measurably reduces fatigue through elimination of wasted steps.

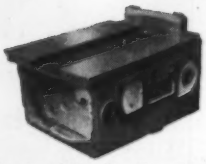
The "bull's-eye" knee and saddle-mounted controls are safety-interlocked and include feed selection, directional Mono-Lever table feed and rapid traverse, automatic cycle table feed and rapid traverse controls, front-mounted table handwheel, saddle clamping gib and backlash eliminator and hand and power directional controls for knee and saddle movements.

In addition, the new TF's give you a superior combination of outstanding design and operating features never before available on any other knee-type milling machines. They're built in five sizes — No. 2 to No. 6 from 10hp to 50hp.

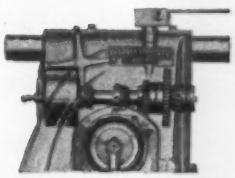
Why take less than the latest when you want new milling machines? You can get all the facts on new TF Series machines from your Kearney & Trecker representative — call him or mail coupon direct to factory today.

A few of many reasons why TF Series milling machines are so easy to operate

Twin Screw Knee Support — Exclusive double-support arrangement most effectively distributes weight of new machines' much wider, heavier knee, saddle and table. Balanced design substantially increases stability under heaviest loads . . . offers greater resistance to torsional thrust under all cuts . . . halves the wear factor, assuring greater, longer-lasting accuracy.



Heavier, Wider, One-Piece Knee — The TWIN SCREW arrangement supports the heavier, larger knee. Span and length of ways is increased considerably, providing fuller saddle support . . lasting accuracy . . . substantial reduction of way and gib wear.



Three-Bearing Spindle — Complete assembly consists of three heavy-duty bearings, flywheel, a train of wide-faced forged steel gears. Rigidity of spindle unit contributes to increased cutter life . . . excellent finish . . . quieter and vibrationless operation.

Massive Column — Solid back, double-box section column is scientifically ribbed throughout to rigidly withstand heaviest cutting forces Full bearing column face affords maximum support for the knee. Cross-mounted motor assures maximum ventilation, easy access for routine maintenance.

KEARNEY & TRECKER
MILWAUKEE

BUILDERS OF PRECISION AND PRODUCTION MACHINE TOOLS SINCE 1898

KEARNEY & TRECKER CORP.
6790 W. National Avenue, Milwaukee 14, Wisconsin

Please send me Catalog No. TF-50 with details on new line of TF Series Plain, Universal and Vertical milling machines.

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Company_____

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US Sand Blast Hose

Dissipates Static Electricity as no other hose can!

Blasting with either sand or steel shot can build up a static electrical discharge so potent that the operator cannot handle the hose. In extreme cases the hose wall may even be perforated by this man-made form of lightning. An exclusive construction makes U. S. Sand Blast Hose *conductive*—and (more thoroughly than any other hose) prevents static build-up.

The strong carcass is built to handle any required pressures—is rigid enough to hold its shape, yet is always flexible for easy handling. High-grade rubber cover resists abrasion. Tube has the high abrasion resistance so essential in steel and shot blasting.

Obtainable at any of the 28 strategically located "U. S." District Sales Offices, or write Mechanical Goods Division, United States Rubber, Rockefeller Center, New York 20, New York.

Mechanical Goods Division

United States Rubber

Buys Mill Equipment

Bethlehem Steel places contracts with Koppers and Mesta Machine for Sparrows Point facilities

EXPANSION of Bethlehem Steel Co.'s Sparrows Point, Md., plant is progressing rapidly. Installation of two galvanizing lines has been completed, and contracts have been awarded for construction of an open-hearth shop and other facilities. Completion of the project will make the plant one of the biggest steelmaking facilities in the world (STEEL, Feb. 6, p. 79).

Koppers' Contract — Bethlehem awarded Koppers Co. Inc., Pittsburgh, a contract for an open-hearth shop with seven 350-ton furnaces and auxiliary equipment. Other projects awarded to Koppers Engineering & Construction Division include a soaking pit shop with 16 pits for the reheating of steel ingots and a slabbing mill shop with a 45 x 90-in. universal mill. Koppers also will build all transportation, utility and related facilities. Construction is scheduled for completion by the end of 1957.

Mesta's Award—Mesta Machine Co., Pittsburgh, has completed a contract covering the design and installation of two 48-in. heavy gage continuous galvanizing lines (STEEL, Feb. 7, 1955, p. 67) at the Sparrows Point plant. These lines will process 13 to 30 gage cold-rolled steel strip 18 in. to 48 in. wide, with a maximum speed of 210 fpm.

At the entry ends of the lines, coils weighing as much as 50,000 lb each and with a maximum diameter of about 73 in. can be handled. These lines were designed to produce either galvanized coil stock with a maximum diameter of 48 in., or steel sheets may be delivered in lengths ranging from 60 in. to 164 in.

In the entry end of each line, a Mesta automatic electric mash welding unit has been installed to join the coils for the continuous process. The delivery end of each line includes a Mesta combination flying shear and leveler complete with classifier and piler for sheets.

The two new galvanizing lines are in addition to the Mesta 48-in. continuous galvanizing line which has been in operation since 1954.

American Can To Build Plant

American Can Co., New York, plans to build a container plant in Woodlawn (Cincinnati), O. Initially, the plant will produce cans for shortening, liquid detergents and beer, as well as for liquid shortening. The factory will have about 200,000 sq ft of floor space and a rated capacity of 200 million containers annually.

Reynolds Opens Warehouses

Reynolds Metals Co., Louisville, has established warehouses for aluminum tubing in St. Louis and Birmingham. Each warehouse will carry about a 700,000-lb stock in a full range of sizes and lengths. More than 40 million lb of aluminum tubing for sprinkler irrigation were sold in 1955, compared with a little more than 1 million lb in 1946.

Ohio Brass Enlarging Plant

Canadian Ohio Brass Co. Ltd., a subsidiary of Ohio Brass Co., Mansfield, O., will add three wings to its plant in Niagara Falls, N. Y. Construction costs will be about $500,000 and a like amount will be spent for new machinery and equipment.

Cutler-Hammer Expanding

Cutler-Hammer Inc., Milwaukee, will build a plant at N. 30th street and W. Hope avenue, that city. The new plant, costing more than $2 million and providing 175,000 sq ft of floor space, will be used for punch press and related operations. A 7000-sq-ft addition to the existing plant administration building also will be built.

Ohio Electric Buys Firm

Ohio Electric Mfg. Co., Cleveland, acquired Kingston - Conley Inc., North Plainfield, N. J., and will operate it as a wholly owned subsidiary. Ohio Electric makes electromagnets and control equipment, special machinery and elec-

(*Please turn to page* 116)

COWLES

TRIMMING KNIVES

produce more tonnage per grind

Cowles knives stay on the job longer. They keep mills in continuous production without downtime for knife changes. Manufactured from individually hammered forgings, and heat treated to assure maximum durability, they meet industry's most exacting requirements. Complete range of sizes. **Prompt delivery.** Widely used by all principal producers and processors. Let us quote on your requirements!

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TOOL COMPANY
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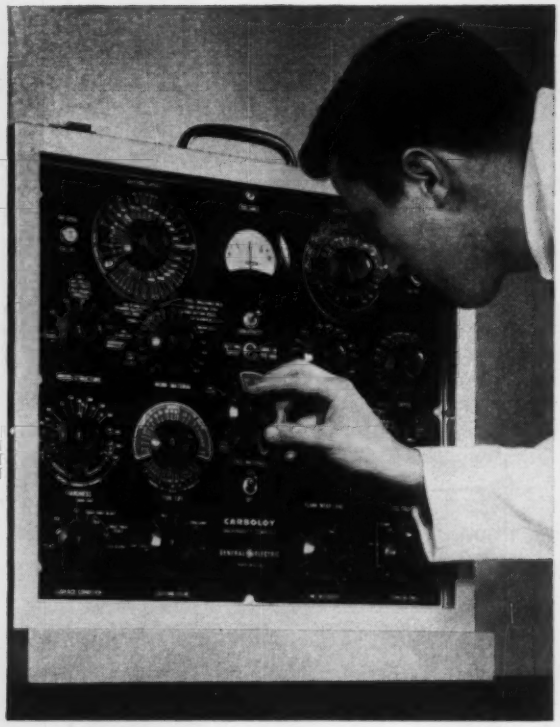
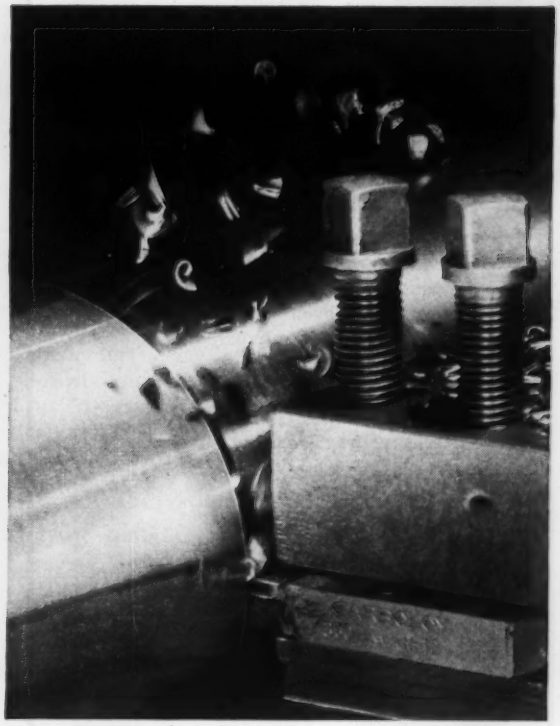
Specializing in the Manufacture of

ROTARY SLITTING KNIVES • SPACING COLLARS • GANG TOOLS • EDGING ROLLS • CUT-OFF KNIVES • SEAM GUIDE ROLL FINS • SEAM GUIDES • WIRE DRAWING TOOLS • STANDARD AND SPECIALLY ENGINEERED TOOLS FOR ALL FERROUS AND NON-FERROUS PROCESSING, TRIMMING AND FORMING REQUIREMENTS.

FOUR POSITIVE STEPS YOU METAL AT THE LOWEST



Carboloy Machinability Computer accurately determines most efficient setup conditions.



Carboloy Grades 350 and 370 cut faster, wear longer. (Picture taken at 1/1000 second).

1 **Solve machining problems with the new Carboloy® Machinability Computer,** and you'll cut out hours of nonproductive setup time, and eliminate wasteful tryout runs. Faster, more accurately than any other method, the Computer determines the most efficient operating conditions for both simple and complex jobs.

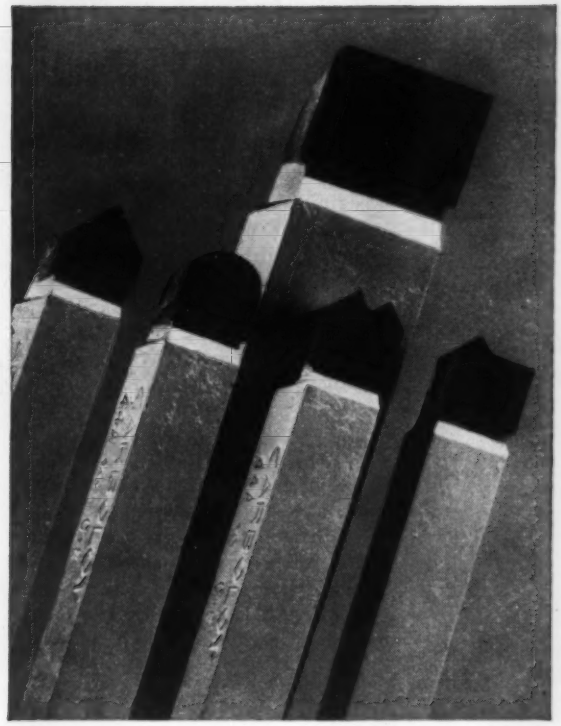
In seconds, it calculates the effect of the 19 most critical machining variables on the material to be cut, the cutting tool, and the cutting conditions. It shows how to set up optimum cutting conditions the first time a job is run, as well as how to improve existing setups. Price of the Computer is $495, f.o.b. Detroit.

2 **Cut steel with Carboloy® Grades 350 and 370,** and you'll increase production while reducing downtime and tool costs. Hundreds of in-plant comparison tests have proved these grades greatly outperform conventional carbides . . . providing the lowest tool-cost-per-piece of any carbide on the market today.

There are no "equivalent grades" for Carboloy 350 and 370, because these grades have a built-in structural rigidity that enables them to take deeper, more punishing cuts without the edge deformation encountered in other carbides. They will cut faster, wear longer, and get more production from your existing machine tools.

Consistent use of these Carboloy products will help you get maximum output from your machine tools . . . at lowest possible cost. For more information and tooling assistance, contact your local Authorized Carboloy Distributor (listed in the Yellow Pages of your phone book), or your Carboloy Representative.

CAN TAKE NOW TO CUT POSSIBLE COST



Style C Standard Carboloy Tool and typical special shapes quickly adaptable from it.

New Carboloy Toolholders can be indexed quickly, easily . . . right in the machine.

3 Apply Standard Carboloy Tools wherever possible, and you'll eliminate many higher cost "specials," while reducing over-all single-point tool inventories by as much as 30%. By standardizing, you will be using only 13 basic styles —"as is," or ground to special shapes – on up to 80% of your setups where braze-type tooling is used.

There are no inventory problems when you use "standards." These versatile tools are stocked in grades to handle any job from roughing to finishing on metals or nonmetals. You can get immediate delivery and tooling assistance from your local Authorized Carboloy Distributor.

4 Make maximum use of the new, easier-to-use Carboloy Toolholders, and you'll reduce tool-change time and lower insert costs. These holders employ a special clamping device combined with a carbide chipbreaker, which makes it possible to index a blank rapidly and accurately without removing the holder from the machine.

In addition, they utilize a shock-absorbent pad beneath the cutting blank, to permit the use of thinner, more economical inserts at increased speeds and feeds. And, because they are versatile, precision tools, they can be quickly adapted to many jobs you are now forced to tool with costly "specials."

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

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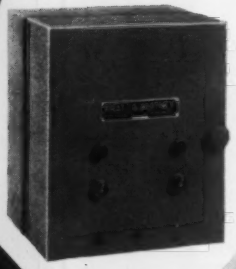
"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

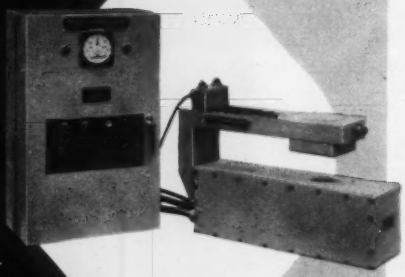
Only PRATT & WHITNEY

manufactures all the types of GAGES and AUTOMATIC CONTROLS for the Steel Industry



AUTOMATIC SCREWDOWN CONTROLS

. . . provide fully automatic control of strip thickness. Now on the job in more than 25 mill installations.



BETA RAY GAGES

. . . Without touching the material, these gages continuously indicate and record thickness or weight deviations in strip or sheet steel, tin plate, brass, aluminum, etc.

X-RAY GAGES

. . . Simple to install and maintain. Stability is excellent, unaffected by voltage fluctuations. Compensated for alloys. Used to gage a wide variety of sheet and strip materials.

CONTACT GAGES

. . . Model D Continuous Gages coupled with P&W Automatic Controls can be arranged to operate warning lights, audible signals and shut-off devices, as well as automatic controls.

AUTOMATIC TENSION and SPEED CONTROLS

. . . provide continuous and complete feed-back control for applications where a vernier on the screwdown is required.

Write for gage literature.

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KEEP QUALITY UNDER CONTROL WITH PRATT & WHITNEY CONTINUOUS GAGES AND AUTOMATIC CONTROLS

MACHINE TOOLS • GAGES • CUTTING TOOLS

(*Concluded from page* 113)

tric motors up to 1/3-hp. Kingston-Conley makes motors from 1/3 to 5 hp and other rotating electrical apparatus.

Buffalo Gets New Warehouse

Stanley Steel Service Corp. has been established at 1612 William St., Buffalo. The new firm will warehouse steel, including cold-finished steel bars. Inventories of about 1000 tons will be maintained.

Burroughs Expands in Plymouth

Burroughs Corp., Detroit, will begin construction this spring on a 204,000-sq-ft addition to its plant in Plymouth, Mich. The expansion will increase the size of the Plymouth Division facility to 840,000 sq ft. An accounting machine is the main product of the plant.

General Refractories To Build

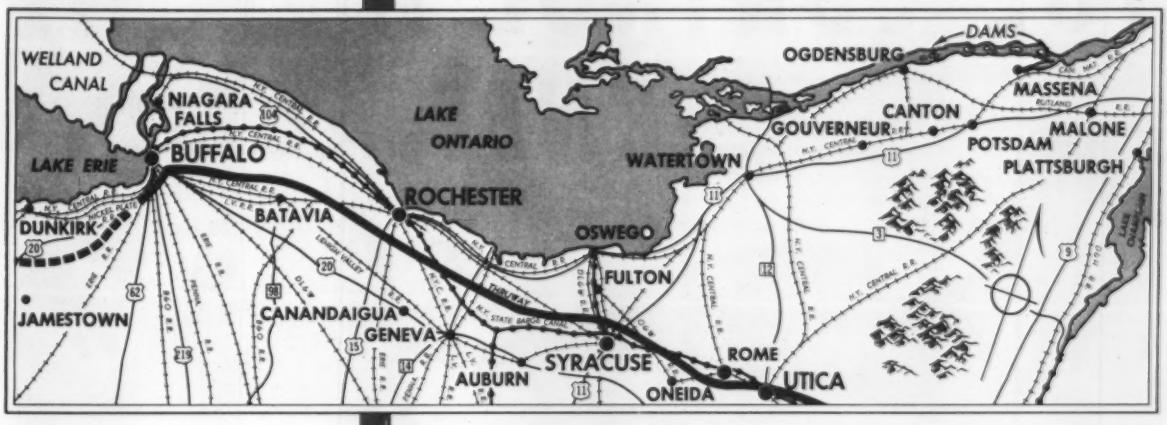
General Refractories Co., Philadelphia, will build a plant at Smithville, Ont., for the production of refractory products. A subsidiary, General Refractories of Canada Ltd., will handle Canadian operations.

Haskins Buys Strand Line

G. R. Haskins Co., Chicago, maker of flexible shaft grinding, polishing and capping equipment, purchased the N. A. Strand Division of Franklin Balmar Corp., Baltimore. E. P. Grismer has been appointed general manager of the N. A. Strand Flexible Shaft Inc., the new Haskins subsidiary.

Wyman-Gordon Installs Press

Installation of a double-acting hydraulic press of 1500-ton capacity has been completed at the Worcester, Mass., plant of Wyman-Gordon Co. The plant now has six hydraulic presses and 31 steam drop hammers. At Worcester, the company specializes in forgings for jet and automotive power plants. At the plant it operates for the Air Force in North Grafton, Mass., it specializes in large, light-metal plane components. It also has a forging plant in Har-



READY NOW... first complete data on PLANT SITE LOCATIONS in New York State's SEAWAY LAND

For the first time, detailed plant site data is now available covering the Nation's newest and most promising industrial frontier—New York State's Seaway Land. Created by the St. Lawrence navigation and power projects . . . Seaway Land comprises an area that pulses with opportunity.

Within three years, completion of the Seaway navigation project will give to New York State's many Seaway ports—and the areas they serve — the ready and economical access to the world's raw materials and the world's markets. Trade routes to the seven seas will connect, in Seaway Land, with the great and smoothly efficient system of railroad, highway, air and inland waterway facilities already functioning in New York State.

The St. Lawrence power project now being built by the New York State Power Authority will be the largest hydroelectric power installation east of the Mississippi. Its power will start flowing in 1958. And the expansion of Niagara power in the near future will add more new power than that generated by the St. Lawrence. Add to these the constantly growing generating capacity of the private utilities, and Seaway Land becomes the nation's power center.

This, then, is the time to examine this area with an eye to your particular requirements. Our industrial location experts are prepared to recommend specific sites in Seaway Land to meet your manufacturing and marketing requirements.

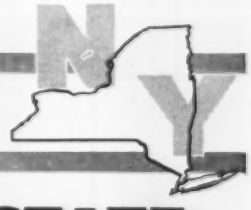
Ready to serve you...

NEW YORK STATE'S INDUSTRIAL LOCATION SERVICE

Our Industrial Location Service stands ready to give you the Seaway Land facts on which you can make a fully-informed selection of the right location for your individual plant.

- **The data we submit is gathered, organized and interpreted for your particular benefit by a staff of experts. It costs you nothing... a free service of the State of New York.**
- **To get your free copy of our booklet–"Industrial Location Services" —write New York State Department of Commerce, Room 386, 112 State St., Albany 7, N. Y.**

SUCCESS BEGETS SUCCESS

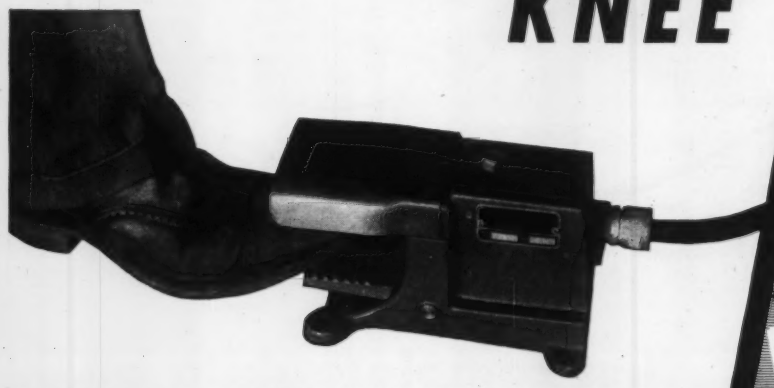


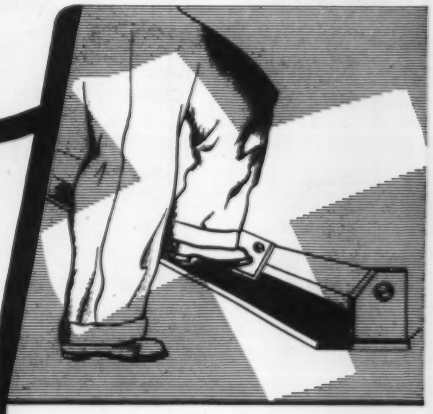
NEW YORK STATE

Averell Harriman
Governor

Edward T. Dickinson
Commissioner of Commerce

TOE CONTROL ELIMINATES KNEE ACTION





ELECTRIC FOOT SWITCH REDUCES FATIGUE - SPEEDS SHEARING

● The operator can slide the switch around the floor to wherever handiest to use. A mere touch of the toe and the knife is set in motion. Electric toe control is standard on all Steelweld Shears and furnished at no extra cost. It enables shearing speeds not attainable with ordinary foot treadles for many cutting operations.

● If you have spent a day at a shear with the old mechanical foot treadle, you know what knee action is. As the hours roll by it grows more and more tiresome, fatiguing, and production slips accordingly.

At last something has been done about it. Electric foot switches have been adopted as standard equipment for Steelweld Shears. Knee action has been replaced by fast easy toe control.

Toe control is one of many outstanding features you get on Steelweld Shears. These machines are in a class by themselves. Learn what they can do for you.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.
7814 EAST 282ND STREET • WICKLIFFE, OHIO

STEELWELD PIVOTED BLADE SHEARS

Gamma Rays Detect Flaws

Radiographing high pressure vessels to detect possible flaws in vital welds is one of the first assignments of the gamma-ray projector introduced by M. W. Kellogg Co., New York

vey, Ill., for production of engine crankshafts. The new Worcester press was made by Birdsboro Machine & Foundry Co., Birdsboro, Pa. It weighs 220,000 lb on the foundation.

Peter A. Frasse Expands

Peter A. Frasse & Co. Inc., steel and aluminum distributor, is erecting an office and warehouse building in Wethersfield, Conn. The 26,000-sq-ft building will triple the size of the firm's building in Hartford, Conn. R. B. Goode is district manager.

Continental Can To Build

Continental Can Co. Inc., New York, is purchasing 40 acres of industrial property in San Leandro, Calif. It plans to build facilities for the manufacture of metal containers sometime in 1957.

Bridgeport Brass Buys Firm

Bridgeport Brass Co., Bridgeport, Conn., acquired Hunter Douglas Aluminum Corp., integrated producer of aluminum strip, cold extrusion and impact forgings. Hunter Douglas operates two plants in Riverside, Calif., and one

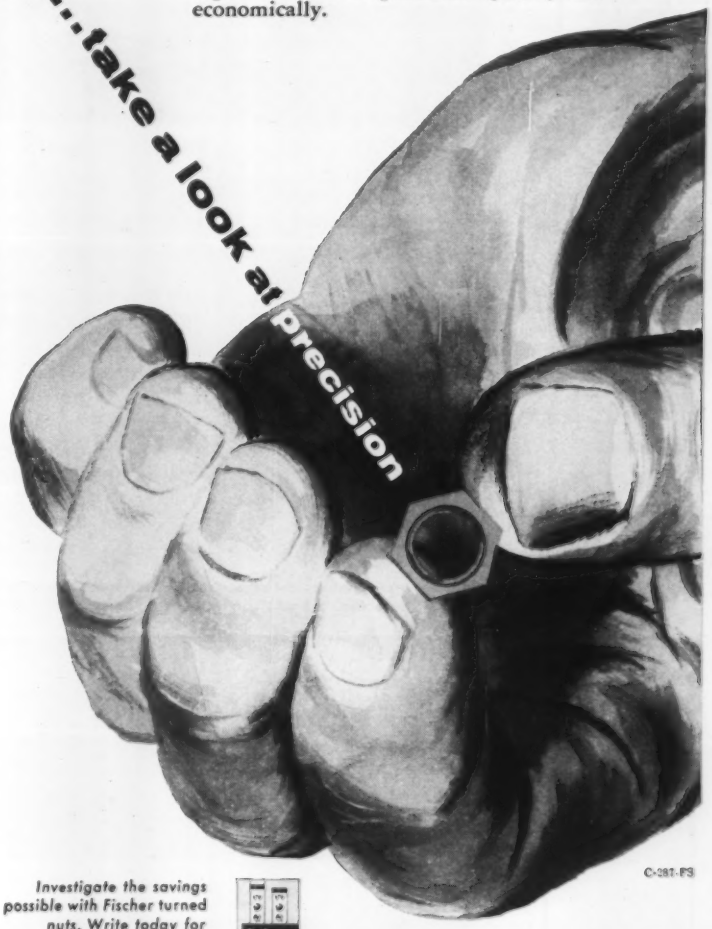
(*Please turn to page* 122)

Because they are produced by *turning*, rather than by less accurate methods, Fischer brass and aluminum nuts set new standards of precision and quality that speed assembly operations . . . reduce costs. Uniformly accurate, Fischer nuts are tapped square with the face to Class 2 tolerances . . . countersunk on both sides . . . burrless . . . cleaned and degreased before delivery.

You pay no premium for Fischer *precision-turned* nuts . . . they're priced no higher than those made by less exact methods.

Prompt delivery of all standard types and sizes is assured by large factory stocks . . . "specials" can be produced quickly and economically.

HERE . . . take a look at precision



C-287-FS

Investigate the savings possible with Fischer turned nuts. Write today for Catalog No. 55.

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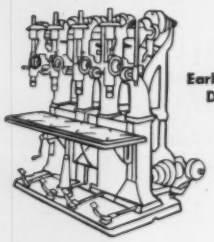
TURNED NUTS Fischer SPECIAL MFG. CO. CINCINNATI OHIO SINCE 1905

W. F. & JOHN BARNES

1872-1956

FROM

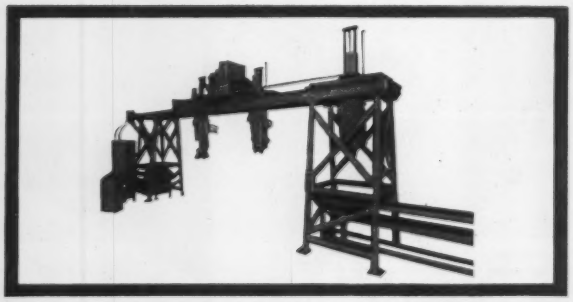
Foot Powered Scroll Saw

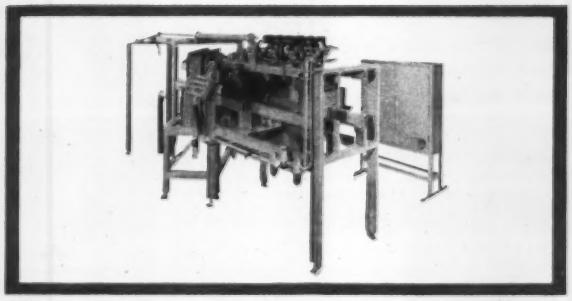


Early Gang Driller

● It was back in 1872 when the ox cart was still used for transporting goods and Edison was still experimenting with the electric light, that W. F. & John Barnes built their first industrial machine — a Foot Powered Scroll Saw. Later in the 1880's, the first Gang Drilling Machine was designed and built. This forerunner of the modern machine tools of today was shipped by ox team to a customer in a nearby town. Three days later, the records say, it arrived at its destination — a distance of 40 miles.

It is also a matter of record that all through these years, from oxen to jets, machines bearing the W. F. & John Barnes' name have been consistently associated with progressive developments and improvements in manufacturing methods. As a result, when you specify a Barnes' built machine today, you get a creative engineering and building service that is seasoned by experience — one that is complete and geared to serve your needs better than ever before.





▲ **SPECIAL CONVEYORS** — typical of variety of units designed and built from standard components to increase material handling efficiency between machining operations. Engineered to meet individual job requirements.

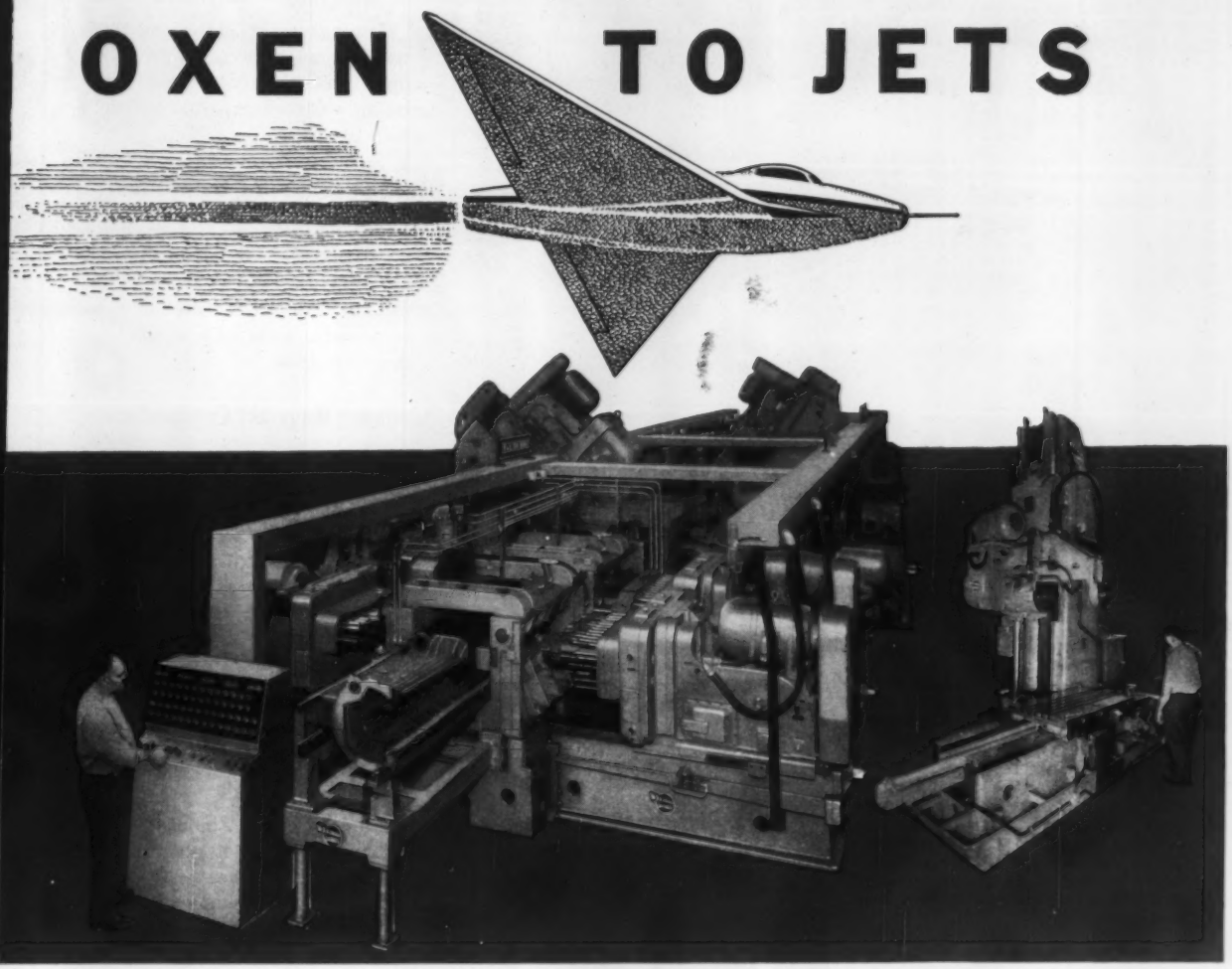
▲ **SPECIAL AUTOMATION EQUIPMENT**—includes a range of turn mechanisms, (illustrated), special transfer and unloading equipment, inspection, and assembly machines, designed for automatic or semi-automatic production-line operations.

W. F. & JOHN BARNES

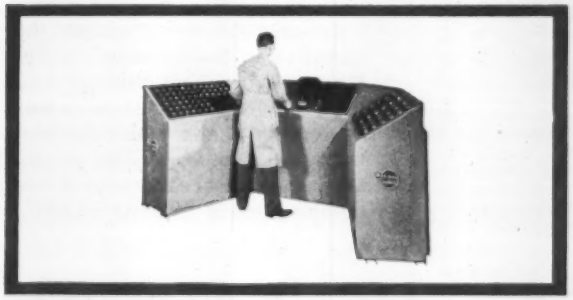
BUILDERS OF BETTER MACHINES SINCE 1872

MULTIPLE SPINDLE DRILLING • BORING • TAPPING

OXEN TO JETS



MODERN MACHINE TOOLS — units illustrated are typical of the large Progress-Thru and Single Station units designed and built by Barnes. 11-Station unit at left was designed to machine both 4 and 6-cylinder tractor engine blocks at 25 pieces per hour. Single-spindle machine at right slab and face mills motor frame mounting pads at 6½ pieces per hour.



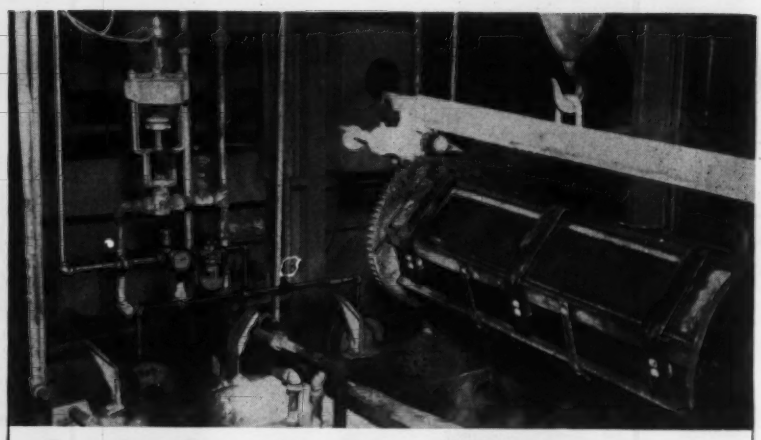
SPECIAL ELECTRICAL CONTROLS — a typical Barnes unitized control system of the sequence type. All are designed to assure the most dependable service and are built to best serve your specific needs.

ELECTRO-GRAPHIC DETECTOR SYSTEMS — a new, exclusive Barnes development. Cuts maintenance time on complex electrical controls up to 90%. Wired-in checking system pin-points malfunctioning elements.

Write **FOR FREE LITERATURE** — New 8-page brochure illustrates and describes Barnes' expanded facilities . . . outlines 6-Point Coordinated Machine Tool Designing and Building Service.

W. F. & JOHN BARNES COMPANY • 434 SOUTH WATER ST., ROCKFORD, ILLINOIS

MACHINES • AUTOMATIC PROGRESS - THRU AND TRANSFER TYPE MACHINES



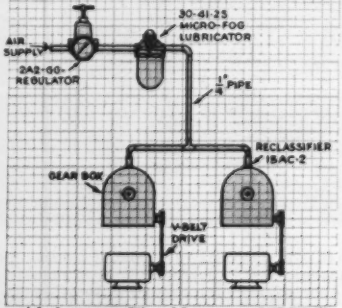
Costly Gear Repairs Ended By Norgren MICRO-FOG Lubrication

... Acid fumes "locked out" of gear boxes on plating tanks at Wagner Electric Corporation

The Problem: At the Wagner Electric Corporation, St. Louis, Missouri, baskets containing parts to be zinc plated in a hot acid solution are mechanically agitated by a gear drive.

With the former drip feed lubrication method, acid fumes entered the gear boxes, contaminating the lubricant and destroying the gear box seals. Loss of lubricant, hot-running gears plus corrosion by the contaminated lubricant greatly accelerated gear wear and resulted in frequent costly repairs.

The Solution: Three years ago, the Norgren MICRO-FOG Lubrication System shown in the picture above was installed to lubricate the gear drives on two plating tanks. The Norgren Pressure Regulator maintains a constant pressure in the gear boxes to prevent entry of

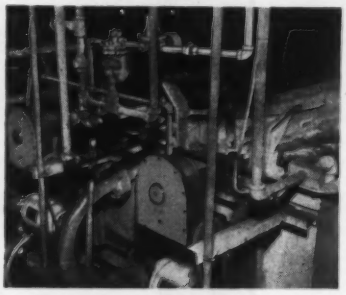


acid fumes. The Norgren MICRO-FOG Lubricator accurately meters oil flow and delivers a continuous fog of fresh, clean oil to the gears.

What Norgren Micro-Fog Is:

Norgren MICRO-FOG is an airborne suspension of extremely small oil particles (.00007874" or less in diameter). Because the oil particles are so small, they can be conveyed long distances through complex piping systems without reclassifying and flooding the lines with oil —a condition formerly not possible with conventional oil-fog systems.

The Results: Norgren MICRO-FOG automatically coats the gears with a continuous film of fresh oil, reducing gear wear and corrosion.



The gear box seal problem has been entirely eliminated because seals are no longer required. Much less lubricant does a more thorough lubrication job—with a substantial saving in lubricant cost. Maintenance costs have been radically reduced.

Without obligation, learn how Norgren MICRO-FOG Lubricators can provide more efficient lubrication and reduce costs in your plant. Call your nearby Norgren Representative listed in your telephone directory — or **Write the Factory for New No. 700 Catalog.**

C. A. Norgren Co.
3412 So. Elati St., Englewood, Colo.

Pioneer and Leader in Oil-Fog Lubrication Since 1930

(*Concluded from page 119*)

in Flemington, N. J. Bridgeport Brass is a major producer of brass, copper and aluminum mill products, as well as fabricated and consumer products.

Dow Chemical To Build Plant

Dow Chemical Co., Midland, Mich., plans to build a $20-million facility in the Baton Rouge, La., area, for the production of chlorine, caustic soda and several organic chemicals.

Lindberg Buys Jet Combustion

Lindberg Industrial Corp., Chicago, purchased Jet Combustion Co., that city, maker of rotary forge furnaces and other large steel mill heating equipment. Lindberg designs and builds large industrial furnaces for melting and heat-treating metals and for firing ceramics.

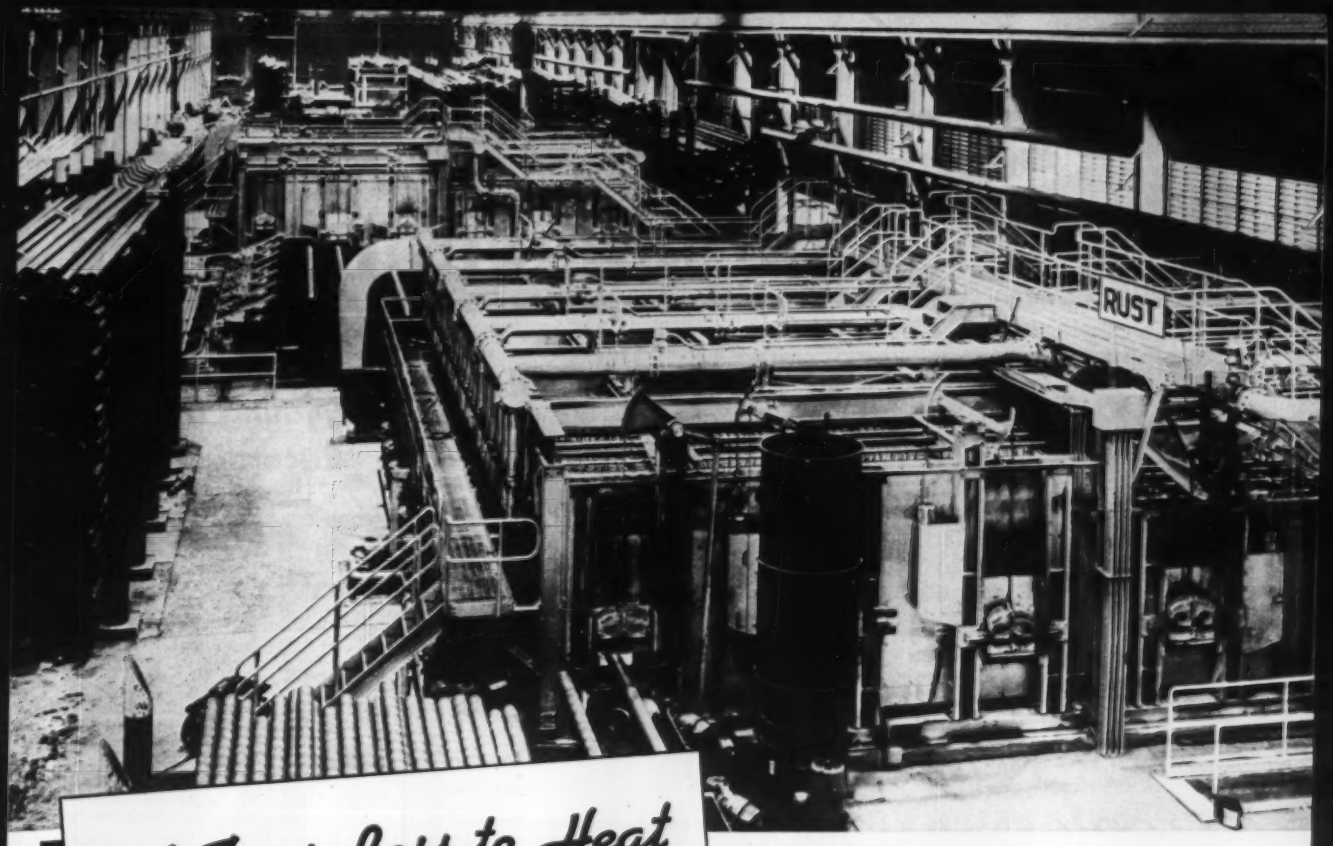
NEW ADDRESSES

Burdett Mfg. Co., pioneer in the development and application of gas-fired radiant heat for industrial heat processing, will move into its new 34,000-sq-ft plant at 4920 S. Monitor Ave., Chicago, about Apr. 1. It will provide an increase of 100 per cent in manufacturing floor space.

Sylvania Electric Products Inc. moved the headquarters of its Electronics Systems Division from Buffalo to Waltham, Mass., where a research center was completed last year. The move does not affect operation of the Great Arrow avenue plant in Buffalo.

REPRESENTATIVES

H. K. Porter Company Inc.'s Laclede-Christy Co. Division appointed J. D. Wilson Co. Inc., Milwaukee, as a distributor of its refractories in the Chicago metropolitan district. Warehouse facilities will be maintained by Wilson at 4452 W. Fifth Ave., Chicago. C. J. Simmons is warehouse manager.



116 Tons Less to Heat in this roof

because of B&W Insulating Firebrick suspended construction

Here's another case where light weight means lower cost. The roof of this walking beam furnace is 2,320 square feet. B&W Insulating Firebrick suspended construction for a 9-inch roof weighs about 30 lbs per square foot, including the weight of rods, hangers, pipe, brick and mortar. This is approximately 100 lbs per square foot less than an arch constructed of heavy firebrick plus insulation having the same heat flow. *This saving means the B&W IFB roof is 116 tons lighter.*

The new walking beam furnace (shown in photograph above) was designed and constructed by Rust Furnace Company for Jones & Laughlin Steel Corporation. Seamless pipe is conveyed into the furnace, moves slowly from left to right on walking beam rails designed and furnished by York-Gillespie Mfg. Co., and passes out the exit door.

Here are the money-saving benefits of B&W suspended construction:

1. Supporting steel is less massive, far less costly. Commercial size steel can be used for roof suspension instead of special castings.

2. B&W Insulating Firebrick heat up and cool down faster. This means lower fuel costs, faster inspection.

3. Furnace temperatures can be changed quickly. When different steels call for different heating schedules, the furnace temperature can be adjusted in minutes instead of hours.

4. Installation costs are lower because these lightweight brick can be handled faster and easier than ordinary heavy firebrick.

This is a cross-sectional drawing of a typical suspended arch arrangement using B&W Insulating Firebrick. It can be used in flat or sloping roofs, nose arches and many other types of suspended furnace construction.

For complete information on B&W IFB—the *lightest* weight insulating firebrick, write to B&W today or call your local Refractories Engineer.

BABCOCK & WILCOX

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GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R 939

Sperry

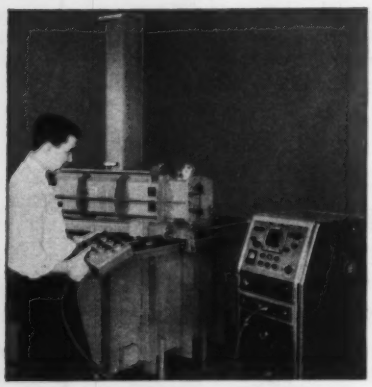
ultrasonic inspection news

SIMAC INSPECTION SYSTEMS NOW AVAILABLE FOR GENERAL INDUSTRY USE

Through the development of standard-unit ultrasonic inspection equipment and auxiliary components, Sperry makes it possible to assemble automatic or semi-automatic SIMAC systems at greatly reduced costs. The basic unit is the Type UW Reflectoscope which can be combined with auxiliary test equipment to meet individual flaw detection requirements. Shown above, the UW Reflectoscope is being used to inspect an immersed aircraft forging which has contours requiring the use of a precision (PH) search unit positioner in order to control the direction of the ultrasonic beam projected into the part.

For contact or immersion testing:

The flexibility of the UW Reflectoscope enables it to handle a vast range of inspection problems, both contact and immersed. It is designed to be operated manually, semi-automatically (as shown at the left) and fully automatically in conjunction with other Sperry-engineered equipment.



The UW's wide range of 9 operating frequencies (from 200 kc to 25 mc) permits driving through coarse material or long distances using the lower frequencies, while the high frequency range can locate the smallest defects.

Immersion tanks have been standardized in several sizes to meet different inspection requirements and are also built to specification.

Automatic Signaling and Recording

The UWA Monitor is designed to operate in conjunction with the UW Reflectoscope to provide automatic signaling and recording of defects. Set up for a specific test, it interprets signals from the UW Reflectoscope and passes on the evaluated information to the operator in the form of signal lights and alarms. Permanent tape records can be made as well as actual automatic marking of the part under test.

Two additional displays of test information:

The UWB attachment supplements the Monitor with a cross-section view of the material being tested, displayed on a 12-inch CRT screen with long image persistence. Two meter indicators measure the amplitude of reflected signals.

To keep posted on latest developments in the profitable use of ultrasonic inspection, send for your copy of our Ultrasonic Inspection News Letter.

S-3

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Danbury, Connecticut

☐ Send me detailed Reflectoscope information.

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STEEL
March 26, 1956

Technical Outlook

MOLD MINDER— A completely automatic plastic impression molding press is cycling day and night at Baker Bros. Inc.'s Toledo, O., plant. Nearing 30,000 cycles, it is testing a Westinghouse Cypac control circuit. Using thyratron tubes, Baker engineers estimate cost of control will be no higher than a relay circuit. The Cypac panel, however, has no moving parts—a natural for the dusty atmosphere of a plastic plant.

DRUNK COMPUTERS—Electronic computers get drunk (unstable) when fed distorted electric power, can hardly add 2 and 2 without an error. Curtiss-Wright's Electronics division, Carlstadt, N. J., has a distortion eliminator that makes current better than 99.7 per cent pure. It's insurance that analog computers will function with a clear head.

FIBERGLASS TANK— The Air Force uses compressed air (3000 psi) to start its F-84 Thunderstreak jet. The reservoir is a 900-cu-in., fiber glass-on-resin tank that weighs only 16 lb. It won't break under 7000 psi.

SMOG SNUFFER— A practical catalytic muffler for passenger cars may be less than six months away. Norris-Thermador Corp., Los Angeles, has been working on one for a year and is now putting it through a series of tests.

BRAZING HIGHS— A high-temperature K-fin, made of stainless-clad copper fins brazed to stainless tubes, will heat or cool a gas on the shell side with a liquid or high pressure gas on the tube side. Useful temperatures: 1600° F on the tube side, 2600° F on the shell side. Another plate-fin exchanger, made of mild steel coated and brazed with a nickel-base alloy, is intended for high-temperature gas-to-gas uses. They include gas turbine regenerators, furnace or kiln air preheaters for recovery of stack gas heat, process gas or air heaters using waste heat and heat recovery units for use with catalytic industrial gas purification systems.

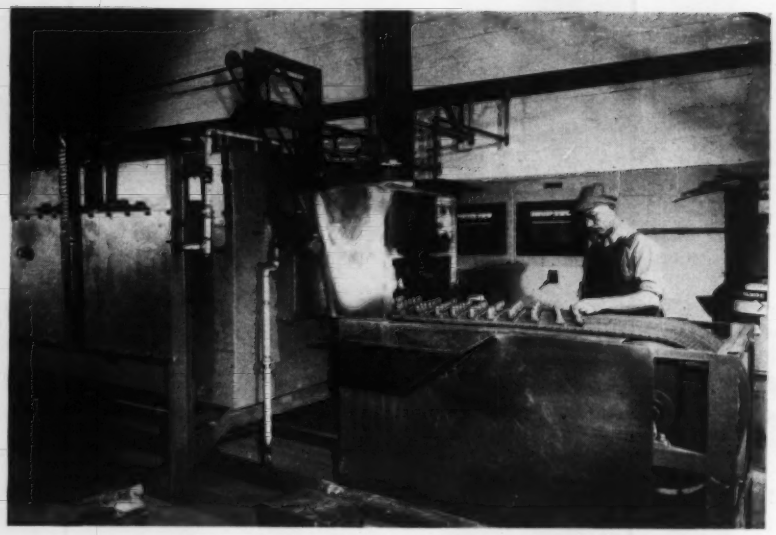
SOUND CASTINGS—Aluminum alloys are improved when sonic vibration is applied during the solidification period. Benefits: Less pipe, finer grain, suppression of dendrites and columnar grains.

TOUGH HIDE—Titanium gets a tough, hard, antigalling surface when it is heat treated in a nitrogen or nitrogen-oxygen atmosphere. Armour Research Foundation gets cases up to 0.010-in. that exceed 1000 VHN (hardness).

HOSE KINK— You can straighten the hoses on your spray gun or gas welding equipment with an inexpensive, re-usable, sparkproof hose strap. It's neat, saves the hose surface and replaces the tape and wire you've been using. You can get them from Binks Mfg. Co., Chicago.

ROUGH ON RUBBER— Present elastomers won't hold up in service in hydraulic fluids for more than 48 hours at 400°F, says the Air Force. Some acrylic rubber compounds show promise up to 550°F, but their aged elongations are too low to make them of wide usefulness. Piloted supersonic craft need a rubber for long-term use in the −65 to 400°F range. Missiles require short-term service rubber that will hold up in the 0 to 500°F range and over.

Metalworking Outlook—p. 79 *Market Outlook—p. 177*



New GE mesh-belt electric furnace at Weatherhead Co., Antwerp, O. This unit brazes hose-end fittings for automobile power steering gear at the rate of 1200 an hour

This is the first in a series of articles STEEL will publish on brazing. Succeeding articles will cover methods, alloys and fluxes, vacuum brazing and brazing of titanium and stainless

Brazing Catches Up

FOR MANY YEARS brazing lagged behind other joining processes. No good reason can be given; some think perhaps it was because designers didn't know enough about the method.

World War II focused attention on brazing. Items for radar, ordnance and marine applications were fabricated in quantities that couldn't be duplicated by other joining methods. In some cases, it was the only feasible method available.

Snowballing — The successful wartime experience and the present need for fast, efficient and economical joining methods have forced brazing to the front.

Recent years have seen a great number of brazing studies, on all types of metals and brazing alloys and in a variety of heating equipment.

The result: Brazing has caught up.

Advantages—There are three big ones: 1. Complex assemblies can be made from formed components, saving materials and machine costs. 2. Assemblies can be made from two or more different alloys to meet specific design requirements. 3. Thin sections that can not be feasibly machined can be brazed to heavier sections without sacrificing strength.

An example covering the three situations can be found in the semi-automatic brazing of heat exchangers. A Ther-Monic induction heating machine is used to braze copper tubes (from 3 to 11, depending on the heat exchanger) in steel pipe headers on both ends. Silver alloy brazing filler metal is used. Three-tube headers are brazed in 2 minutes; an 11-tube header takes 9 minutes.

Design—Here, as in all brazed assemblies, successful joints depend on proper design. Brazing filler metals are drawn into the joint by capillary attraction and partially diffuse into the base metal, forming a new alloy with new properties.

Unlike a weld, a braze is thin. (Copper brazed joints for most steels should not be over 0.001-in.) Joint design should utilize as much adjacent surface area as feasible to give a good, strong braze (see table on joint design).

Methods — Four methods account for most production work: Furnace, induction, salt bath and gas-fired machine brazing. While resistance brazing lends itself to automatic operation, it is restricted primarily to joining small parts, such as electrical connections, composed of copper and copper alloys.

Most work being done today is copper brazing of mild steel in controlled-atmosphere furnaces. Furnace-brazed assemblies are replacing parts that were forged in one piece, machined out of solid stock, cast welded or riveted. Stewart-Warner Corp., Chicago, has eliminated much costly machining and welding by furnace brazing many of its automotive and lubrication parts.

One example: Metal ferrules were machined in one piece; now they're broken down into components which can be quickly produced on screw machines or punch presses and brazed in a General Electric mesh-belt furnace. Over 1350 subassemblies an hour can be brazed.

Hardening—In many cases it is possible to braze and harden the base metal simultaneously. (This also is true of salt bath brazing where much carburizing is being done.)

A jet engine valve seat assembly (see photo) being brazed at Hamilton Division of Bendix Aviation Corp. is formed from two stainless steels (the rosebud is of AMS 5632, the seat is AMS 5640). Braze material is 0.015-in. copper wire. The rosebud is hardened to 55 Rockwell C while the seat stays soft.

and the two parts are joined—all in one operation.

Induction Brazing — In furnace brazing, the entire assembly is brought to the brazing temperature. If the area to be brazed is small in comparison with the total size of the part, a selective method, such as induction brazing, usually is better.

One area where induction brazing is used almost exclusively is in carbide tipping of tools. In the induction coils of the brazing machine, the silver alloy filler metal melts rapidly and forms a strong bond between the tip and the tool shank.

Brazed Cylinder — Commercial Shearing & Stamping Co., Youngstown, used to machine a small, hydraulic cylinder assembly from a solid bar. The process was improved by welding a plug in the base of a tube. These parts now are brazed on a Tocco induction brazing machine. The heating time has been reduced from 15.3 to 2 minutes on the 5¼-in. ID cylinder. Machining and cleaning operations called for by welding are no longer needed.

Salt Bath Brazing—This method is widely used, especially in aluminum work. Even heat makes for fast, efficient brazing when parts are of thin section, or intricate pattern. Design must permit preplacement of the filler metal, using a self-jigging assembly or one that is staked, tacked or held in a fixture.

Salt bath furnaces are versatile; they can be used for brazing, carburizing and hardening. G. H. Leland Inc., Dayton, O., uses a furnace made by Ajax Electric Co., Philadelphia, for all three processes.

One item, a ball-bearing case and flange assembly of SAE 1010 steel, is brass brazed and carburized simultaneously. Joints have an average strength of 40,000 psi; case depth is 0.005 to 0.007 - in., with a surface hardness of R 15N 80-85.

Flame Method — In gas-fired brazing machines, natural or manufactured gas, mixed with air and pressurized, burns in a molded refractory cup. As with induction brazing, this is a localized heating method. A great variety of fix-

Brazing Processes, Equipment and Procedures

Torch Brazing

Heating is done with a torch or torches, manually or by machine. Manual torch brazing is useful on assemblies which have sections of unequal mass. Machine operations can be set up where the rate of production warrants using one or more torches equipped with single or multiflame tips. For premixed city gas-air flames, the refractory-type burner is used. Brazing filler metal may be preplaced or face fed (fed from hand-held filler metal).

Twin-Carbon Arc Brazing

Although not used extensively, this process provides fast heating. Two graphite or carbon electrodes are spaced in a holder to give a flaming arc. The intense heat of the arc requires careful manipulation of the flame to avoid overheating. Machine twin-carbon arc brazing normally is not used. The brazing filler metal is usually face fed.

Furnace Brazing

This method is used extensively where parts to be brazed can be assembled with the filler metal preplaced near or in the joint. It is particularly applicable for high production brazing. Fluxing is used except where atmosphere is introduced to perform the same function.

Furnaces usually contain heating and cooling chambers and have automatic time and temperature controls. They can be batch or continuous types, heated by electricity, gas or coal. Four types of furnaces are used: Box, conveyor, retort and bell.

Induction Brazing

The necessary heat is obtained from an electric current induced in the parts to be brazed. In induction brazing, parts are placed in or near an alternating-current-carrying coil and do not form a part of the electrical circuit.

Brazing filler metal is usually preplaced. Careful design of the joint and coil setup are necessary to assure that the surfaces of all members of the joint reach the brazing temperature at the same time. Flux is used except when an atmosphere is introduced to perform the same function.

The three common sources of high-frequency electrical current used for induction brazing are the motor-generator, resonant spark gap and vacuum tube oscillator.

Resistance Brazing

Heat is obtained from the resistance to the flow of an electrical current through the electrodes and the joint to be brazed. Parts comprising the joint form a part of the electrical circuit. The filler metal can be preplaced or face fed. Flux is used except when an atmosphere is introduced to perform the same function. Conductivity of the flux is important. (Most fluxes are insulators when dry.)

Parts to be brazed are held between two electrodes. In some cases, both electrodes may be on the same side of the joint with a suitable backing to maintain the required pressure.

Equipment consists of tongs or clamps with electrodes attached at the end of each arm. The tongs should be water cooled to avoid overheating. Resistance welding machines also are used. Electrodes may be carbon, graphite, refractory metals or copper alloys, depending on the required conductivity.

Dip Brazing

There are two methods: Chemical bath and molten metal bath.

In chemical bath dip brazing, the filler metal is preplaced, and the assembly is immersed in a bath of molten salt. The salt bath furnishes heat and protects from oxidation.

In molten-metal-bath dip brazing, the parts are immersed in a bath of molten brazing filler metal contained in a suitable pot. Parts must be cleaned and fluxed if necessary. A cover of flux should be maintained over the bath. This method is confined largely to brazing small parts, such as wires or narrow strips of metal.

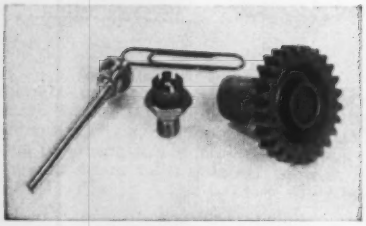
Block Brazing

In this method, the heat comes from large metal blocks which are separately heated and applied to the work. The heated blocks (which also act as jigs to hold parts in alignment) raise the parts to brazing temperature and cause the filler metal to flow. Filler metal usually is preplaced.

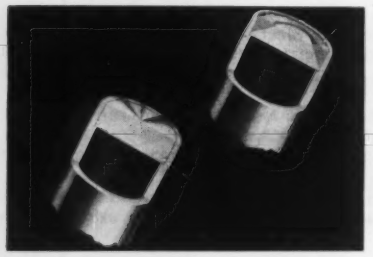
Flow Brazing

This is a process in which molten brazing filler metal is poured onto the joint, preferably from one side. It is giving way to other brazing processes which are more economical and efficient.

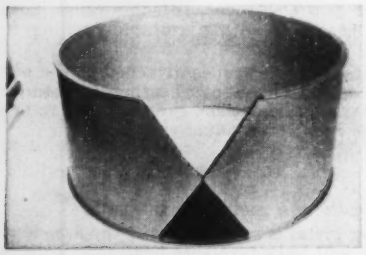
Source: American Welding Society's *Brazing Manual*.



Three stainless parts furnace brazed with copper filler metal. At left is a thermostat needle. The tube is AMS 5570; cap is AMS 5640. The assembly is chrome plated after brazing. At center is a jet engine valve seat assembly. The rosebud is AMS 5632; seat is AMS 5640. The part is brazed and the rosebud hardened to 55 Rc at the same time. The seat stays soft. The gear assembly at right is threaded and splined internally. The gear (AMS 5616) is hardened to 45 Rc and the plug (AMS 5613) to 35-45 Rc while the assembly is brazed



This hydraulic cylinder was made by welding a plug into a cylinder. Now it is brazed. Heating time is reduced; machining and cleaning operations are eliminated. Arrows point to weld and preplaced brazing alloy



Honeycomb sandwich cylindrical casing is fabricated by brazing at GE's aircraft gas turbine plant

Examples of tube-filled and finned, air-cooled turbine blades. Tubes were brazed to the shell with a Ni-Cr alloy

tures can be used to braze assemblies automatically.

One fabricator is brazing all-aluminum core assemblies for auto air conditioners at the rate of 50 completed assemblies an hour. A Selas 8-station machine brazes both ends of flat tubes to tube sheets at a fuel cost of 0.5 cent each. The machine's indexing dial conveyor subjects each assembly to a heating time of 70 seconds under two ceramic gas burner units, which can be raised or lowered to accommodate cores of different sizes.

Clad Metals—Chicago Bridge & Iron Co., Birmingham, Ala., fabricates clad metals by brazing. The base plate is cut to predetermined size, the braze metal applied and the cladding metal positioned in place.

The assembly is heated in special equipment while pressure is exerted on the exterior surfaces. A high vacuum is maintained between the two metals. The braze material also serves as a barrier to prevent carbon migration from the base plate to the clad surface.

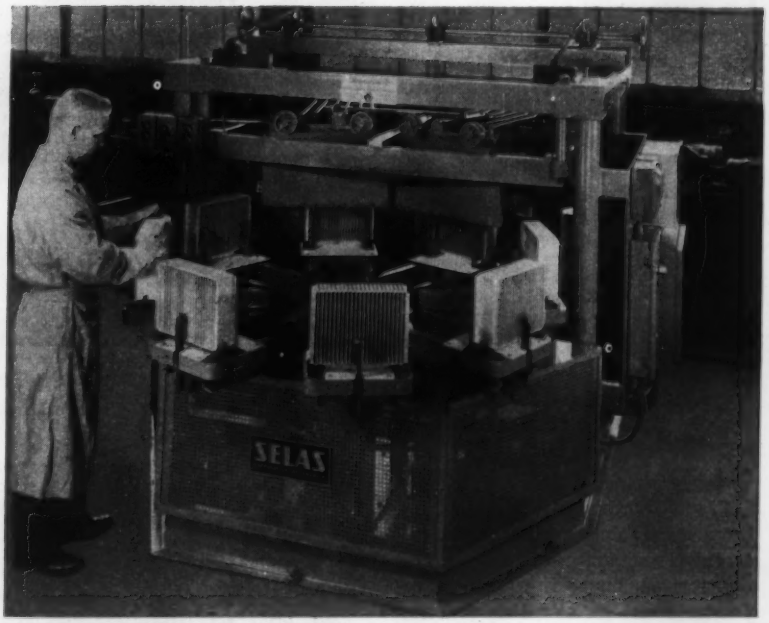
Brazing Alloys—Copper and silver alloys are the old stand-bys in brazing filler metals. While they have good wetting properties and alloy well with nearly all metals, they don't have the strength needed at elevated service temperatures.

One of the newer brazing alloys developed for this purpose is Nicrobraz, a nickel-chromium base alloy made by Wall Colmonoy Corp., Detroit. It has a solidus temperature of about 1850° F and a flow point of around 1950° F. The alloy flows and brazes well in dry hydrogen atmospheres.

Jet Part—Stainless steel water-alcohol check valves used in the GE J-47-25 turbojet engine are Nicrobrazed and furnace hardened simultaneously. The brazed joints have a tensile strength equal to that of the base metal at temperatures up to 2000° F.

Researchers at NACA, Lewis Flight Propulsion Laboratory, Cleveland, used the Ni-Cr alloy in their experiments on air-cooled turbine blades for jet engines. Brazing the shells to their bases and tubes and fins inside the shells gave excellent results.

Honeycomb Structures—A major problem facing aircraft gas tur-



A manufacturer of heat exchangers brazes all-aluminum core assemblies for auto air conditioners at the rate of 50 an hour on this gas-fired brazing machine

bine engineers is the design of lightweight structures rigid enough for engine use. Sheet metal fabrications are being replaced by more efficient structures, such as the brazed honeycomb sandwich, which combines high rigidity with light weight.

The photo on page 128 is that of a honeycomb sandwich cylindrical casing fabricated at GE's aircraft gas turbine plant, Evendale, O. Outer skins are 0.010-in. thick; the honeycomb core is ¼-in. thick. The casing has a section modulus roughly equal to that of a solid piece of material 0.100-in. thick, but is only about one-fourth as heavy as a solid structure of equal rigidity.

The structure is furnace brazed in a reducing atmosphere with a high-temperature, nickel-chromium-silicon brazing metal which is sprayed on. Brazing temperature is over 2100° F.

High Nickel—Coast Metals Inc., Little Ferry, N. J., has a new series of nickel-silicon-boron alloys that can be used to braze most metals with melting points above 1850° F. The alloys have nearly the same mechanical properties, corrosion and oxidation resistance as the stainless and heat-resistant alloys they are designed to join.

A new nickel-phosphorus material has been developed for brazing stainless, nickel-base and cobalt-base alloys, as well as low-alloy and carbon steels for service temperatures from 60 to 1500° F. Known as Nicrobraz No. 10, the alloy is used as a paste and can be applied by brushing or spraying.

Braze-Clad—Another new product in the fast-growing brazing field in Braze-Clad, made by American Silver Co., Flushing, N. Y. It comes as a ferrous or nonferrous metal strip with silver brazing alloys prediffused on one or both sides of the base metal.

The material is used as a brazing shim (as in brazing carbide tool tips), or the entire part is stamped and formed from the material. In this way, the brazing alloy will be automatically preplaced so that blind joints and large area joints can be brazed easily.

Fixtures—One of the problems in brazing has been fixturing. The repeated heating and cooling of metal fixtures, particularly in furnace brazing, often weakens and distorts them. In induction brazing, it is desirable to keep all metal except the assembly being brazed away from the field of the induction coil.

One approach to the fixture problem has been ceramic jigs, supports and fixture blocks. Sur-Braze Grade HT-1, made by Technion Design & Mfg. Co. Inc., New York, withstands operating temperatures in excess of 2200°F without warping, oxidizing or changing size. Fluxes and brazing alloys will not corrode or adhere to the material. In induction brazing, the ceramic's nonconductivity decreases the cycle time about 45 per cent over metal fixtures.

The Future—Brazing is a process that readily lends itself to automation. There are thousands of assemblies being fabricated by other means that could be produced better and more economically by brazing.

Copper and Ni-Cr brazing of stainless steels will grow rapidly. Kicked off by the increasing use of these materials in the aircraft industry, parts and assemblies formerly made of brazed aluminum are being made of stainless.

Another possibility for growth is the combination of brazing with powder metallurgy. Many of the problems of brazing porous sintered metal parts have been solved; powdered metal parts are being successfully brazed.

Big Savings — Combining the production savings of these two operations offers attractive possibilities for complicated parts and assemblies which are difficult and expensive to produce by other methods.

Rising labor and material costs, coupled with fierce competition, will prompt industry to examine all its products (including the old stand-bys) to find a cheaper way to assemble or fabricate. In many cases, this will be brazing.

Brazed Joints

Successful brazed joints depend on correct design, assembling the joint members properly and selecting a suitable heating method for the job. When planning a brazing job, consider these points:

1. Proper joint clearance is probably the most important factor
2. The most successful applications are those subject to shear
3. The lap-type joint gives better physical and electrical properties than butt and scarf joints and is easier to produce
4. Each filler metal has an optimum range of clearance which applies in joining similar metals and metals of equal mass
5. When brazing dissimilar metals or metals of unequal mass, special consideration must be given to selecting the filler metal and determining the joint clearance
6. Joint design should minimize stress at the joint
7. Joint design should specify the method of feeding the filler metal into the joint
8. If several joints on the same assembly are fairly close together, step brazing should be specified
9. Joints in pressure-tight assemblies must be vented to permit escape of hot gases generated during brazing
10. When possible, assemblies to be brazed should be self-jigging
11. Each heating method has its own advantages and requirements. Regardless of heating method and whether filler metal is face fed or preplaced, only the joint surfaces (not the filler metal) should receive direct, sustained heat. The joint should be brought to brazing temperature as rapidly as possible

Source: A. N. Kugler, "Brazed Joints," *Machine Design*, Feb. 23, 1956.

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No. 23 in STEEL's Modern Heat Treating Series

TEMPERATURE CONTROL OF

HEAT TREATING FURNACES

PART III

By R. M. SILLS
General Electric Co.
Schenectady, N. Y.

Checking thermocouple readings on a GE Reactrol panel

Control Instruments

THE FUNCTION of a temperature control instrument is to give a direct temperature indication and provide a control action.

Present-day control instruments are basically indicators and/or recorders, with the control action obtained from the indicator. A few years ago, it was not practical to use a low level signal for control without first converting it to a pointer movement. Today, magnetic and electronic amplifiers make direct contact practical.

Instruments that use expanding metal, liquid or gas devices are based on simple, mechanical linkages. They are the least expensive and are used extensively in chemical and petroleum plants where low temperatures are common and in low temperature furnaces and ovens. Thermocouples, temperature sensitive resistors and radiation detectors require one of two different instruments—millivoltmeters or potentiometers.

Operation — Millivoltmeters are similar to d'Arsonval direct-current voltmeters and ammeters. Current in a coil which moves between the poles of a permanent magnet produces a torque which turns the coil against a restraining spring. A pointer attached to the coil moves across a scale.

Since the coil current is small, the instrument must be carefully made. Accuracy depends on the strength and uniformity of the magnet and the quality of the spring and the pivots on which the coil is suspended.

A few years ago, millivoltmeters were not accurate. Today, these instruments are accurate to about 0.75 per cent full scale, and have a sensitivity of about 0.13 per cent.

The resistance of the source affects the accuracy of millivoltmeters. For highest accuracy, the instrument should be calibrated for the external resistance with which it will be used. To minimize external resistance changes, the internal resistance of the instrument should be high (see Chart, Part II, STEEL, Feb. 20, p. 139).

Instrument resistances vary with the scale range and depend on the type of thermocouple. For a range of 0-2000° F, calibrated for chromel-alumel, the resistance is

in the range of 650 to 950 ohms. With 950 ohms, a change in lead wire length of 30 ft will cause an error of about 0.7 per cent, for example.

Adaptation — Millivoltmeters are not readily adaptable to a suppressed zero scale (one that starts at some temperature above zero). Although they can be built with a suppressed zero scale, this reduces the available torque, lowers the internal resistance and makes it more difficult to check the accuracy of the instrument because of no zero point.

How It Works—All modern millivoltmeters use electronics for control action. A small vane is attached to the pointer and a pair of coils to the temperature setting pointer. The coils are part of an electronic oscillator. When the indicating pointer reaches the set point, the vane passes between the coils, changing their mutual inductance. This causes the oscillator to start or stop. The sudden change in oscillator plate current operates a relay.

This system is continuous, does not affect the indicating function of the instrument and is sensitive, requiring a change of only about 0.1 per cent of full scale to open or close the relay in the plate circuit.

Millivoltmeters have many advantages for control of furnaces. Among these are low initial cost, smallness, simplicity of construction, low maintenance costs and a high degree of reliability (they fail-safe).

Restrictions — Millivoltmeters have limitations. They are not so accurate as potentiometers and are affected by changes in ambient temperature or thermocouple lead resistance. Their pivots wear if subjected to extreme vibration, and the instruments must be level at all times. They are not adaptable to producing a permanent record, although there is one make available which has a recording unit attached to it.

For furnace control, a most serious limitation is the number of control forms with which they may be equipped. Normally supplied with either one or two control relays, they may be used for certain types of proportional control but cannot be supplied with additional control contacts or features desirable in other applications.

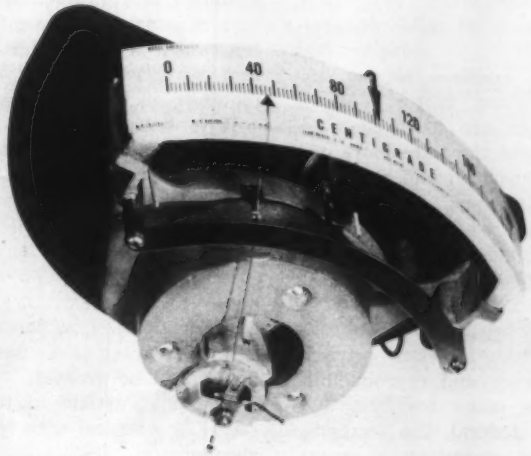
Potentiometers — Two important features distinguish a potentiometer from a millivoltmeter. First, it is a null-balance device—no current is drawn from it by the amplifier. This means it is practically independent of external resistance, a contribution to its high accuracy. Second, the power for operating the slide wire (the temperature indicating device or the control switches) is supplied by a motor rather than the signal. Theoretically, unlimited power is available for recording and/or control-actuating devices. They are essentially unaffected by friction, vibration or tilting.

Basic Forms—Three major forms of control are available:

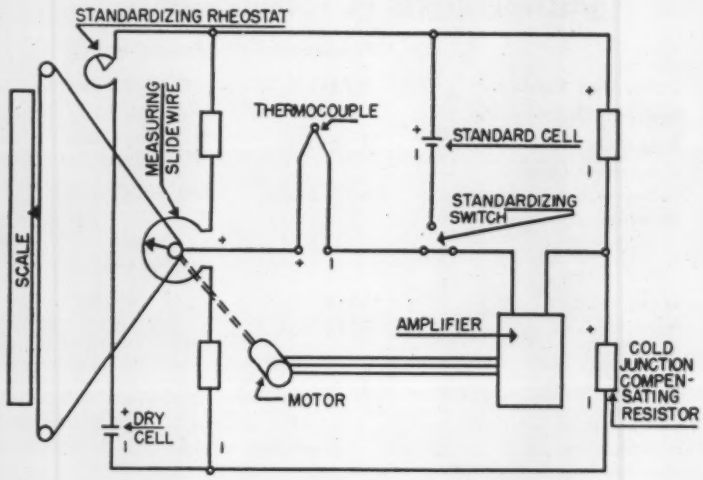
1. Contacts for two or three-position control. These are switches operated by the temperature indicating pointer. They may be set from the front with the set point (front set) or from the back (back set or fixed). Front sets are used for temperature control, while back sets might be used to operate alarm circuits.
2. Slide wires for modulating con-

MILLIVOLTMETERS VS. POTENTIOMETERS

	Millivoltmeter	Potentiometer
Calibrated Accuracy	0.75-1%	0.25-0.5%
Reproducibility	0.1%	0.03%
Response Time	12 seconds	1-24 seconds
Maximum Lead Resistance	15-30 ohms	500-2500 ohms
Number of Control Switches	1-2	3-6
Panel Area	89-125 sq in.	132-365 sq in.
Weight	15-32 lb	75-100 lb
Price	$216-232	$475-550



Millivoltmeter indicator for pyrometer equipment. Note the vane on the indicator and the coils connected to the setting pointer



Basic circuit for a self-balancing potentiometer

CONTROL INSTRUMENTS

trols. In place of, or in addition to the control switches, potentiometers can be equipped with small slide wires. These are front set and provide a signal that is proportional to the deviation from the set point.

3. Pneumatic control. In this form, the instrument varies air pressure, which can be used to operate valves, cylinders, etc. Pneumatic control is common in the petroleum and chemical industry (because of the explosion hazard) and on fuel-fired furnaces.

Which To Use—The advantages and disadvantages of potentiometers are just the reverse of those applying to millivoltmeters. In most industrial furnace applications, the required results can be obtained with either.

The absence of a chart record is most conspicuous in millivoltmeters. Remember that the chart contributes nothing to the control functions of the instrument but merely provides a history of what has happened.

What use are charts? There is no question of their value in analyzing trouble like overheating. The question is whether failures are frequent enough to justify the expense.

Charts—In a multizone furnace, a chart record of every zone isn't always necessary, especially for zones in which the work is coming up to temperature.

Is a separate chart for each zone more desirable than a single chart recording several temperatures? On a furnace with millivoltmeters controlling each zone, a separate multipoint recorder can be used to record all temperatures. For four or more zones, this is less expensive. In addition, the multipoint recorder may be used to provide overtemperature protection and as a check of millivoltmeter accuracy.

The chart question is not the only determining factor. Many potentiometers are used that do not record, and they are more expensive to purchase and maintain than millivoltmeters.

Other Factors—What do potentiometers provide?

Remember, we are considering two or three position control where no unusual vibration or motion is involved. Potentiometers provide higher accuracy and reproducibility with the same response and control. In general, the temperature variation, measurement errors due to cycling, gradients in the furnace and thermocouple errors add up to several times the error of the instrument; the higher accuracy of the potentiometer is wasted. It may be that the justification for the potentiometer is not the accuracy but in security and confidence.

Modulation—Although the comparison has been for contact control, millivoltmeters can be used for modulating type controls as well. The same basic instrument may be used with either radiation detectors or resistance thermometers. The circuits differ somewhat, but the principles are essentially the same.

Two instruments can be operated from a single thermocouple, if the proper precautions are observed. The most common situation would be an indicating instrument used for control and a multipoint indicator to obtain a record from the same thermocouple.

When the multipoint recorder is connected, it may interact with the permanently connected instrument, upset its temperature indication and cause faulty control action. The amount of upset is proportional to the difference in temperature reading between the two instruments at the time they are paralleled and the resistance that is common to both instruments.

To Reduce Interaction—The simplest and best method for reducing this interaction is to use separate lead wires for each instrument. This is especially necessary if the permanently connected instrument is a millivoltmeter. The current drawn by the millivoltmeter causes a voltage drop in the lead wire, resulting in erroneous readings on the potentiometer.

It is better to use a separate thermocouple for each instrument. When separate thermocouples are used, each instrument may be used as a check on the other thermocouple and instrument.

Radiation detectors generally have higher resistances than thermocouples. In general interaction between the two instruments will be greater.

The next article in this series (Apr. 2) will deal with the control element.

• *Extra copies of this article (one of six in a series on temperature controls) are available in quantities of one to three until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

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Since the initial announcement of this radically new Revere Product intense interest has been displayed by American industry. The Revere Sales Offices, the Technical Advisory Service and the Research and Development Department will be glad to provide additional information, and collaborate with you in taking advantage of this extraordinary new material.

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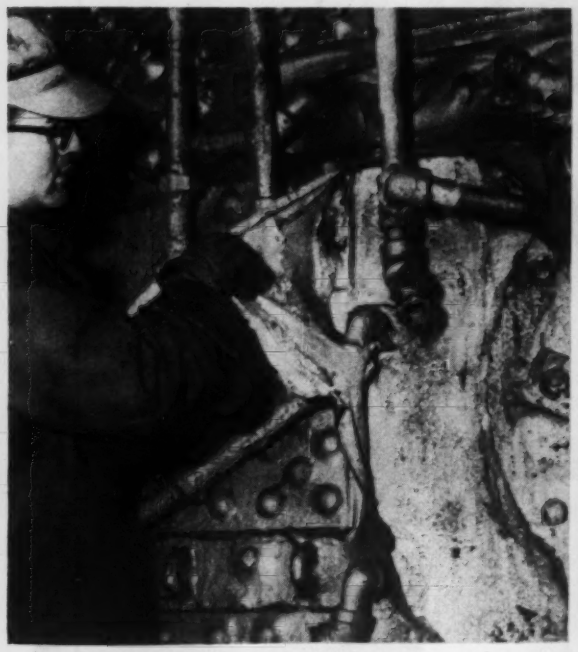


Stripping the plastic seal from the bosh section

Overlapping of final plastic coating to the tuyere jacket

Blast Furnace in Moth Balls

Highlights from the winter meeting of the Blast Furnace & Coke Association of the Chicago District

REMEMBER the moth-balled ships? The Navy's cocoon technique has been adapted to blast furnaces that have to be temporarily shut down.

By spinning an airtight plastic web around the bosh of a furnace on indefinite bank, Inland Steel Co. held stock movement to 2 ft in 55 days. When the furnace was blown in after that period, the coke in the lower bosh was still in excellent shape.

Reservations — Such slow burning in a banked furnace is far from common, but Frank R. Kik, junior blast furnace engineer at Inland's East Chicago Works, was cautious in evaluating the moth-balling technique. He pointed out to the winter meeting of the Blast Furnace & Coke Association of the Chicago District that it had been tried only twice.

In the first trial (94 days), several variations of lacquer and plastic sprays (thinned and unthinned, applied with varying degrees of air pressure) were tried. Results were no better, and perhaps worse, than when vermiculite, tar-base paint, fire clay or sodium-silicate slurries were used to seal the bosh.

Knowing How—Here's how successful sealing was accomplished:

On Aug. 13, 1954, Inland's No. 2 blast furnace was banked for an indefinite period. Before banking, the bosh section and mantle circle pipe were washed down with high pressure water. After banking, bridle bolts were removed and tuyere pipe unions swung away from the bosh. No bulkheads were placed in the tuyere openings.

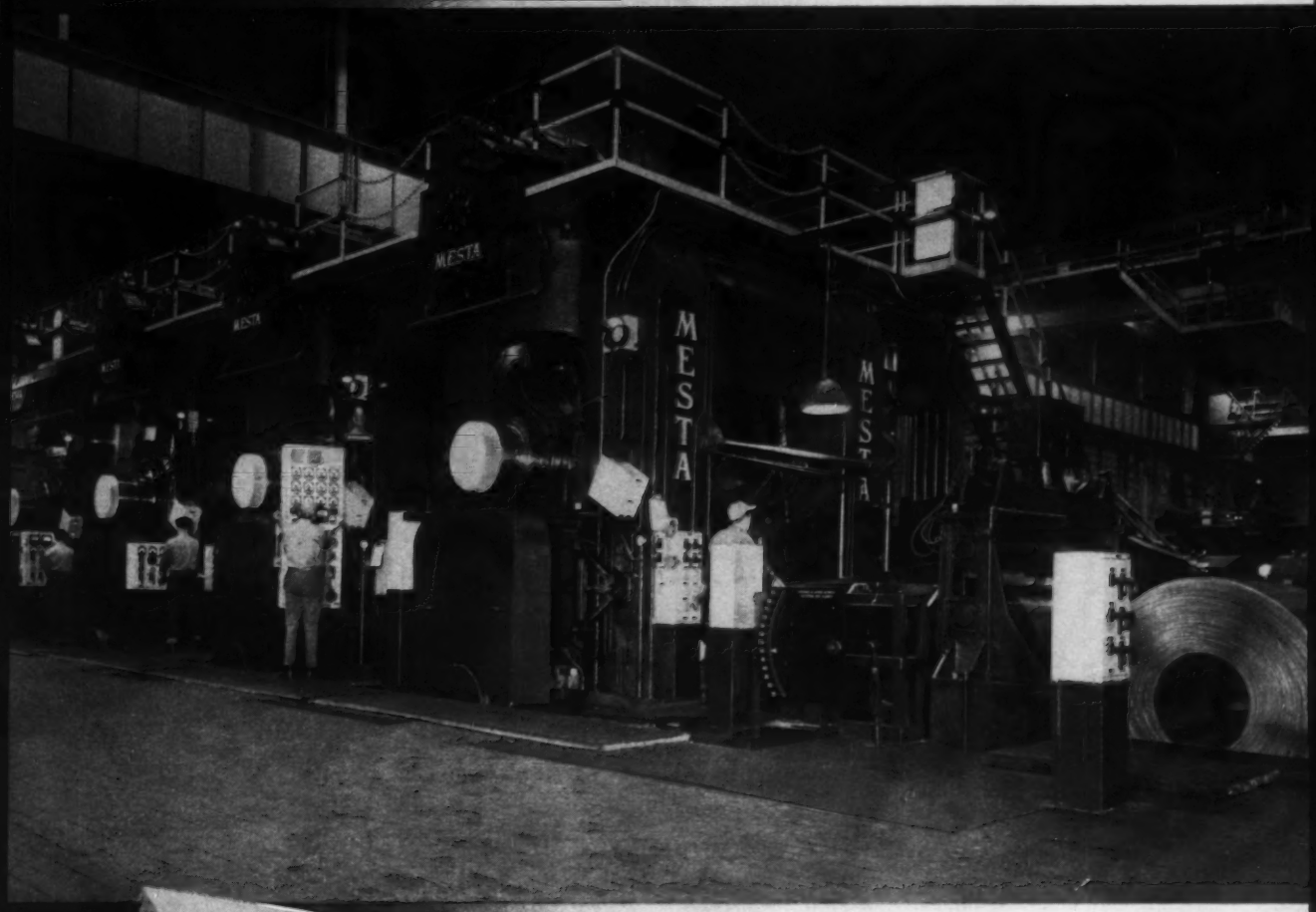
The spraying material was a vinyl plastic of low viscosity which quickly congealed into a rubber-like strippable coating. It was fed from 55-gallon drums to the spray guns by a recirculating pump and agitator driven by a 1-hp air motor. Plastic was supplied to the guns through ½-in. hoses and atomizing air through ¼-in. hoses.

Web—The seal went on in two steps, beginning an hour after the blast was taken off. First, they sprayed a web over the entire bosh and overlapping the mantle, with the gun held 12 to 18 in. away. Web openings were held to ½-in. or less.

The hot mantle kept the upper portion of the web tacky, but by spraying a fine web over the entire top row of bosh plates and allowing it to dry before strengthening with additional webbing, it was possible to get a firm connection to the mantle.

Seal—Over the loose web went three more coats of plastic, making an air-tight sheet about 1/16-in. thick. The final coating was continued over the brickwork and onto

HIGH SPEED COLD MILLS



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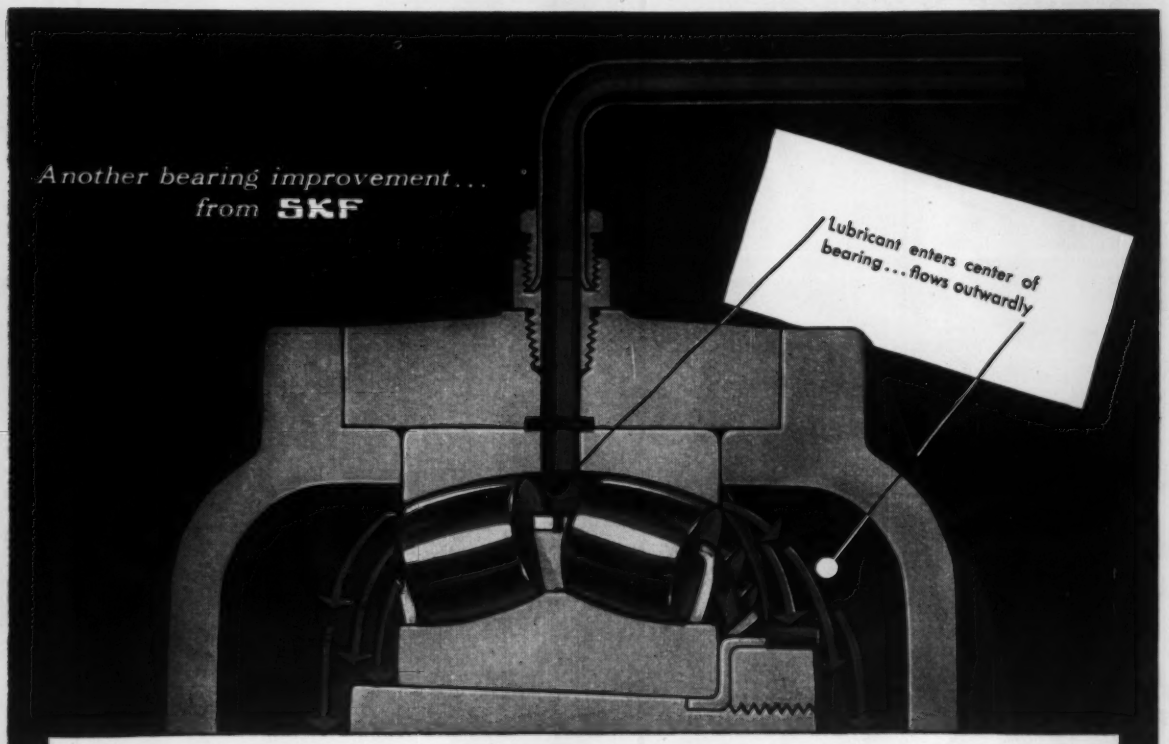

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To make the lubricant effective it should be located where needed—in the bearing. Also, new lubricant, when added, should enter where it does the most good—in the bearing.

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Final sealing of tuyere opening

Bosh section of the furnace banked and moth balled

the tuyere jacket and bosh bands to guarantee a seal if any shrinkage should occur, even though the material is elastic.

Operating with two pumps and four spray guns, and spraying around the clock, the operation was completed in 54 hours. The vinyl plastic contained no benzine or other volatile solvent, but the operators wore respirators as a precaution and no smoking or open flames were permitted during spraying.

When the furnace was blown in after 55 days, it was only necessary to slit the plastic with a knife and peel it away, or to melt it off with a gas torch.

Upgraded Ore — The Humboldt mine, operated by Cleveland-Cliffs for Humboldt Mining Co. (jointly owned by Cleveland-Cliffs and Ford Motor Co.) is completing its second year of treating low-grade specular hematite ores by froth flotation. The mine and concentrating plant are 12 miles west of Ishpeming on the Marquette Range.

Richard R. Smith, metallurgist, Cleveland-Cliffs Iron Co., Ishpeming, Mich., described the concentration process at the Chicago meeting. This first unit produces approximately 250,000 tons of concentrate per year. Only 44 per cent of original weight of mined rock is retained and shipped as a concentrate. It has been upgraded from 33 to over 62 per cent iron.

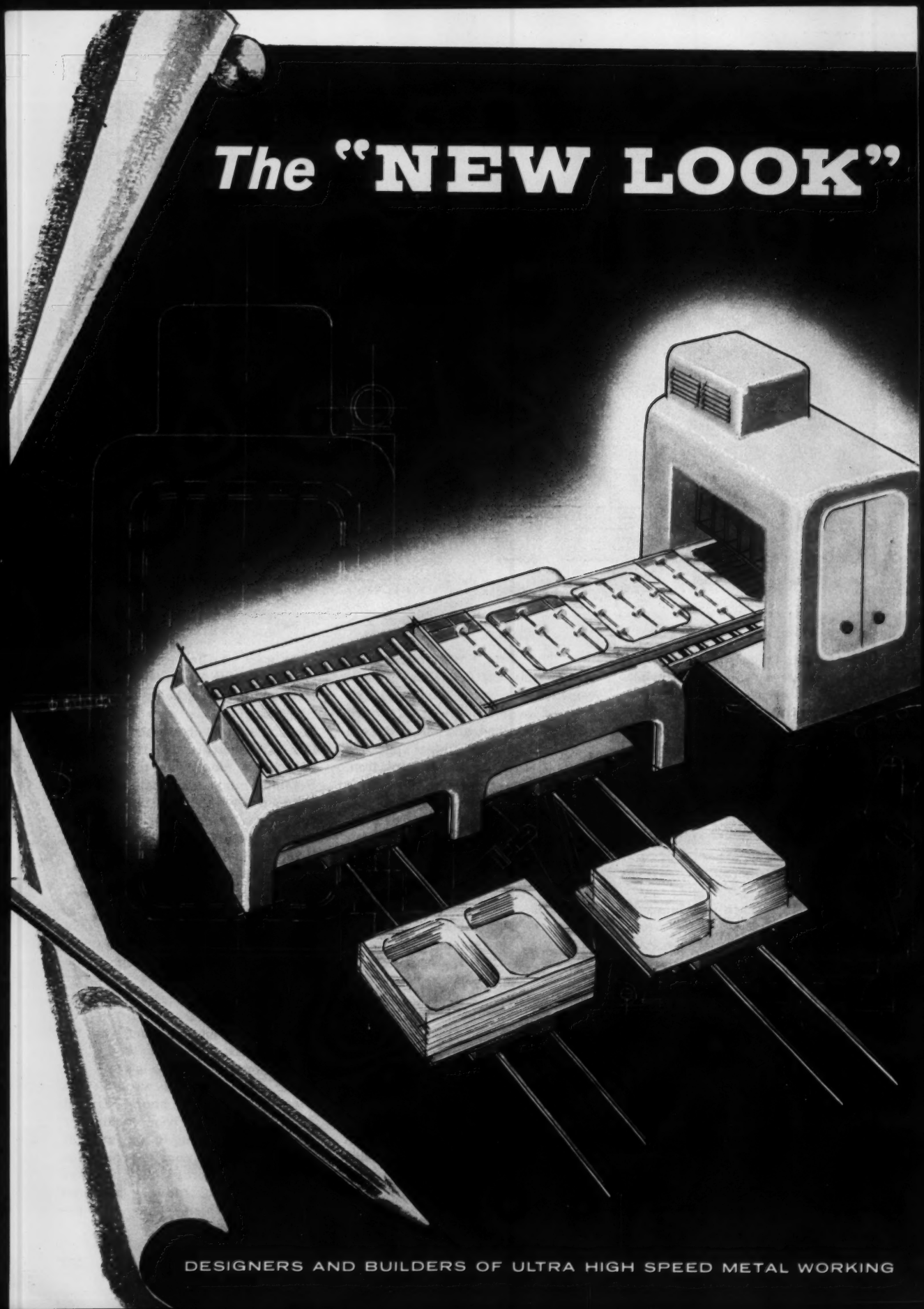
Efficiency—Of the tailings which are thrown away, about half the original weight is rejected from the flotation circuit, and about 7 per cent as slimes. In this system, 85 per cent of the available iron units have been recovered. In the flotation system by itself, the recovery is 89 per cent. The Humboldt plant is producing at a rate of over 1½-times its designed feed rate of 70 long tons an hour. This increase has been made possible by additions in equipment and by the flexibility of the first unit.

More Capacity — Improvements developed as an outgrowth of the Humboldt experience have been incorporated into the Republic mine, 8 miles south. This plant will be twice the size of the Humboldt plant, with provisions for additional units as the ore body is opened up. Start of production at Republic is scheduled for the first quarter of this year.

As part of Cleveland-Cliffs' expansion on the Marquette Range, a pelletizing plant is being constructed at Eagle Mills, near Negaunee, Mich., to treat concentrate from the flotation plants. Its startup will follow closely on that of the Republic mine. The future of this range is assured by the growing tonnage of high-grade beneficiated ore shipped down the lakes.

Sintering—Charles Hoffman, superintendent of sintering plants and pig cast, Ford Motor Co., Dearborn, Mich., described two sintering plants operated at Ford's Rouge plant. One handles flue dust and the other is designed for ore concentration.

Much of the success in concentrate sintering is due to the cooperation of operating and maintenance forces. For example, a down period for maintenance is scheduled each Thursday, and an effort is made to limit it to 8 hours. Planned maintenance is given credit for increasing sintering output at least 5 per cent. The company also has rigid training programs for sinter plant personnel and has prepared a manual which spells out the duties of operators.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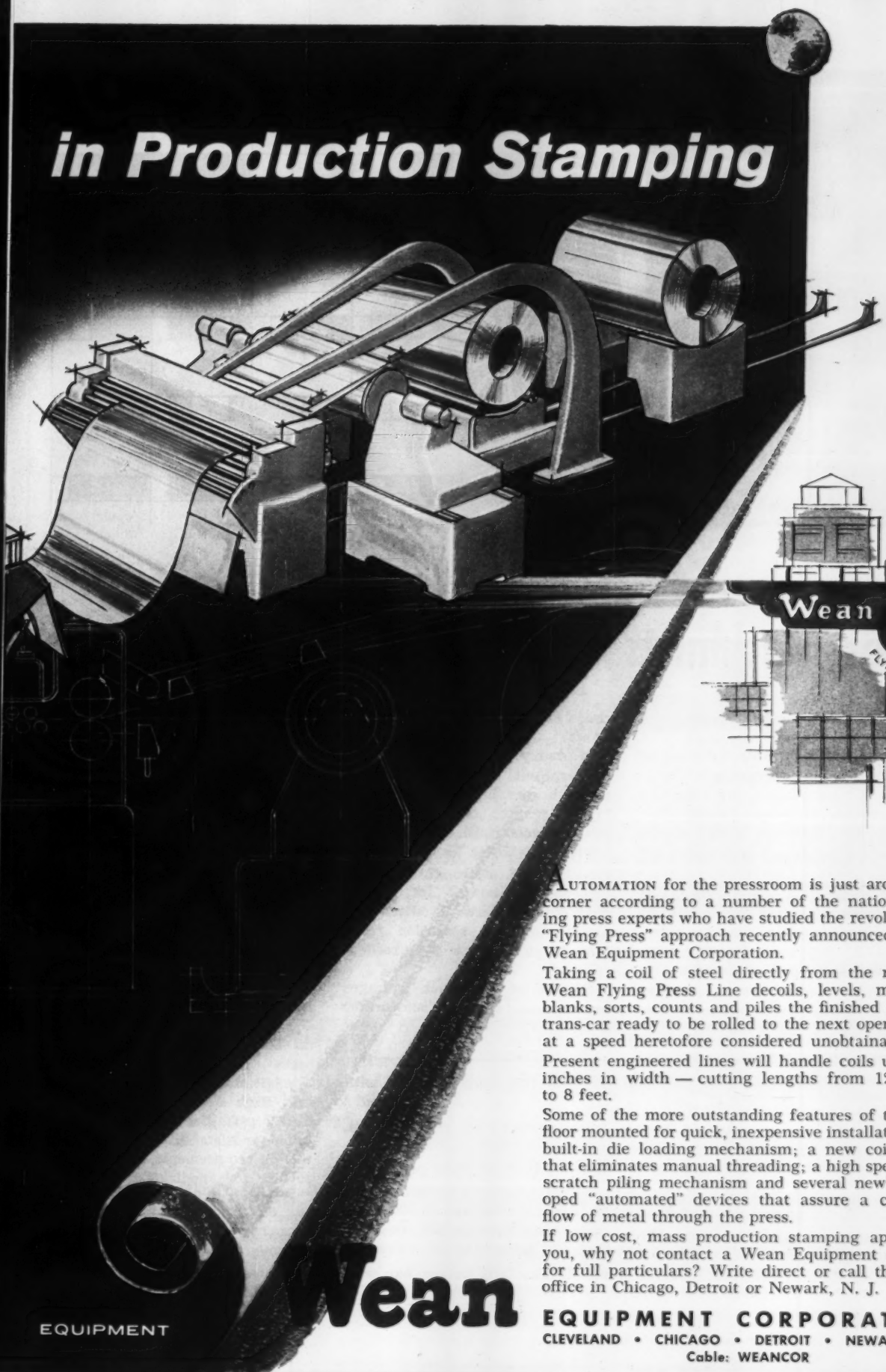

AUTOMATION for the pressroom is just around the corner according to a number of the nation's leading press experts who have studied the revolutionary "Flying Press" approach recently announced by the Wean Equipment Corporation.

Taking a coil of steel directly from the mill, the Wean Flying Press Line decoils, levels, measures, blanks, sorts, counts and piles the finished piece on trans-car ready to be rolled to the next operation — at a speed heretofore considered unobtainable.

Present engineered lines will handle coils up to 72 inches in width — cutting lengths from 12 inches to 8 feet.

Some of the more outstanding features of the line: floor mounted for quick, inexpensive installation with built-in die loading mechanism; a new coil sticker that eliminates manual threading; a high speed, non-scratch piling mechanism and several newly developed "automated" devices that assure a continual flow of metal through the press.

If low cost, mass production stamping appeals to you, why not contact a Wean Equipment engineer for full particulars? Write direct or call the Wean office in Chicago, Detroit or Newark, N. J.

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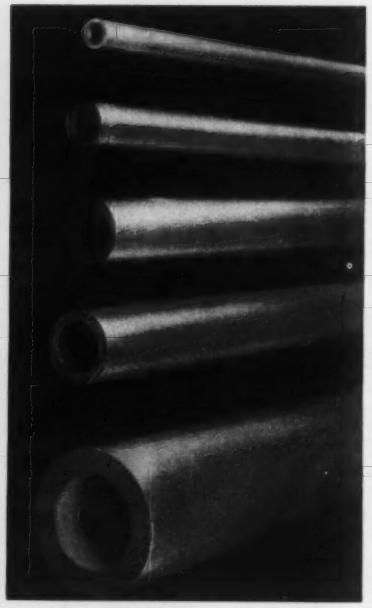
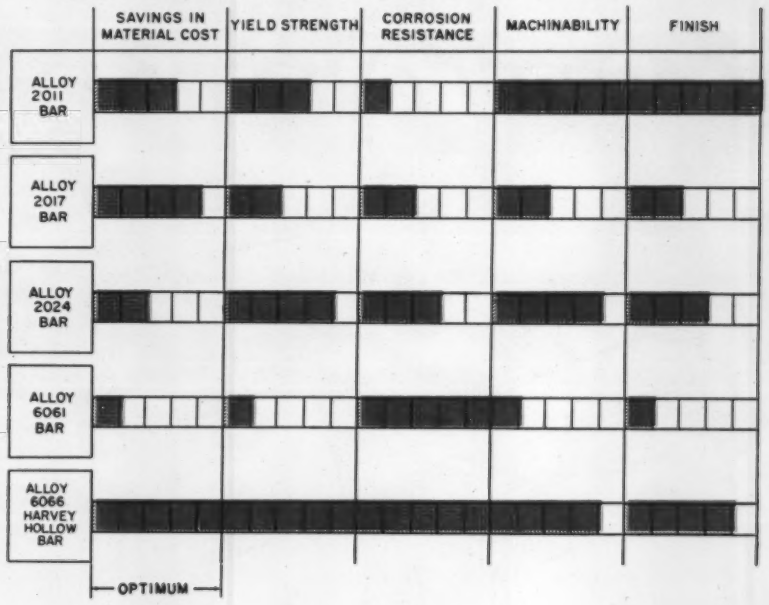


Machining Comparison Chart for Aluminum Bar Stock



For Machinists: Hollow Aluminum Bar

NOW IN full-scale production, hollow aluminum bar stock bids fair to capture a wide following in screw machine operations.

Just introduced by Harvey Aluminum Division, Harvey Machine Co., Torrance, Calif., it will offer clear-cut advantages for many machined parts.

Plusses—"Material saving is one of its strong points," states Homer M. Harvey, production vice president. "Material cost when using hollow bar stock is always less than the cost of solid bar stock in the standard aluminum screw machine alloys, regardless of shape or size.

"Not only will a producer be able to turn out aluminum machined parts cheaper, but he'll also obtain high strength, reduced machine time and good finish."

Flyweight—The new machining stock is 6066, a wrought alloy developed by Harvey. Its general characteristics are: Good machinability, superior corrosion resistance, high strength and excellent finish.

Weight of the stock averages less than half that of a comparable size solid aluminum bar resulting in lower handling costs. Better chip control is another advantage. With little metal to hog out, there is a reduction in the amount of chip pulling, handling and processing.

Because no time is required to rough out a cavity, the stock increases the speed of machining; decreases cycle time.

Good Inside — Tests performed over long production runs demonstrate that the new product has superior machining qualities for inside-working tools, since it has the same cold worked properties on both inside and outside surfaces.

Additional advantages claimed are: High strength (typical yield, 52,000 psi), good corrosion resistance and stability, reduction in tooling requirements, and a better surface for anodizing.

Harvey is making the hollow stock in standard round bar in a range of sizes. Diameters run from 1 through 3½-in. Wall thicknesses vary from 0.109 to 0.500-in.

Material Cost Study

Job: Aluminum part requires 3-in. OD machining bar with a 2.625-in. hole

Solid Bar: Cost per foot for 3-in. standard round bar, alloy 2024-T4, is $3.96

Metal drilled out per foot is 6.46 lb at $0.14 per pound, or $0.90

Cost per foot of stock is $3.06 ($3.96 minus $0.90). The figure doesn't include machining time or the time and labor involved in handling and processing the chips

Hollow Bar: Cost per foot for 3-in. OD standard hollow bar with 0.188-in. wall is $2.15.

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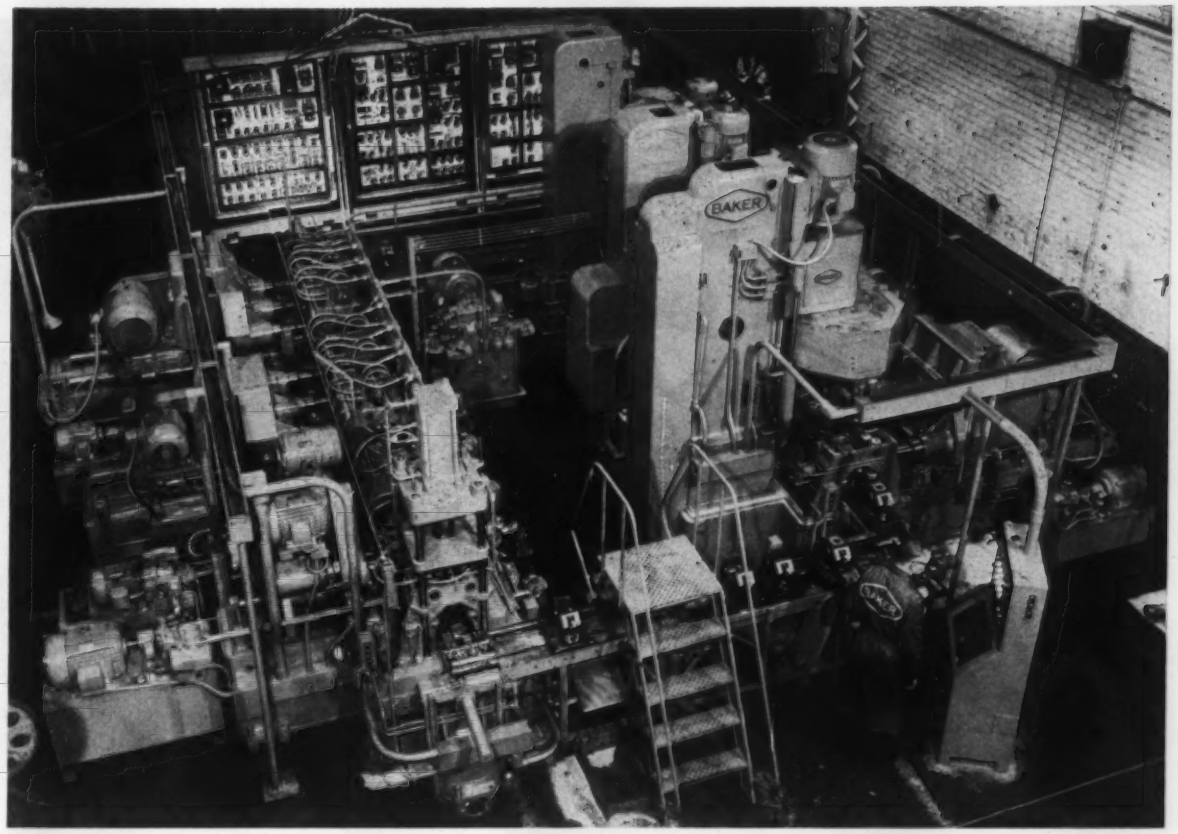


Transfer machine for valve bodies has 236 total horsepower. It will process one hundred three ⅜-in. bodies or fifty 2-in. bodies an hour. Parts move down the right side, back up the side at left

Valvemaking: Detroit Style

IN AUTOMOTIVE circles, the transfer machine is old hat. But when another industry tries it on for size, it frequently is news.

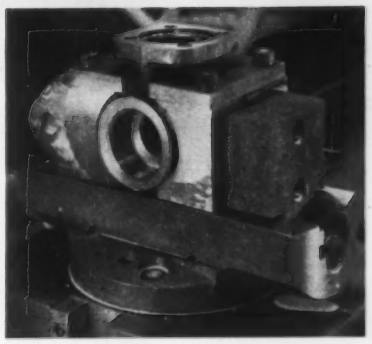
So far, automation is spotty in the valve industry. Most valves are turned out on standard, or near-standard machine tools. Dunking its toe into automatic production, the Hancock Valve Division of Manning, Maxwell & Moore Inc., Stratford, Conn., will make eight different valve bodies on a single transfer machine.

Variety — Seven sizes of gate valves, from ⅜ to 2 in., are scheduled for the machine. In addition, the 600-lb globe valve is on the list.

All parts are steel forgings. Forged tolerances permit chucking in two-jaw chucks with interchangeable vee-jaws. Change-over time from one job to another is kept to a minimum. Jaws can be switched on the 22 platens in jig time. Tool and adapter lengths are preset to allow for a size change.

Route — Platens, carrying the parts, slide on hardened rails. Guide rails on each side keep the platen in line. At each station a tapered shot pin drives into a tapered slot in the platen, pinning it against the locating side rail, and, at the same time, centering the platen with the machine spindles. Clamps also pin the corners of the platen to the bottom rails.

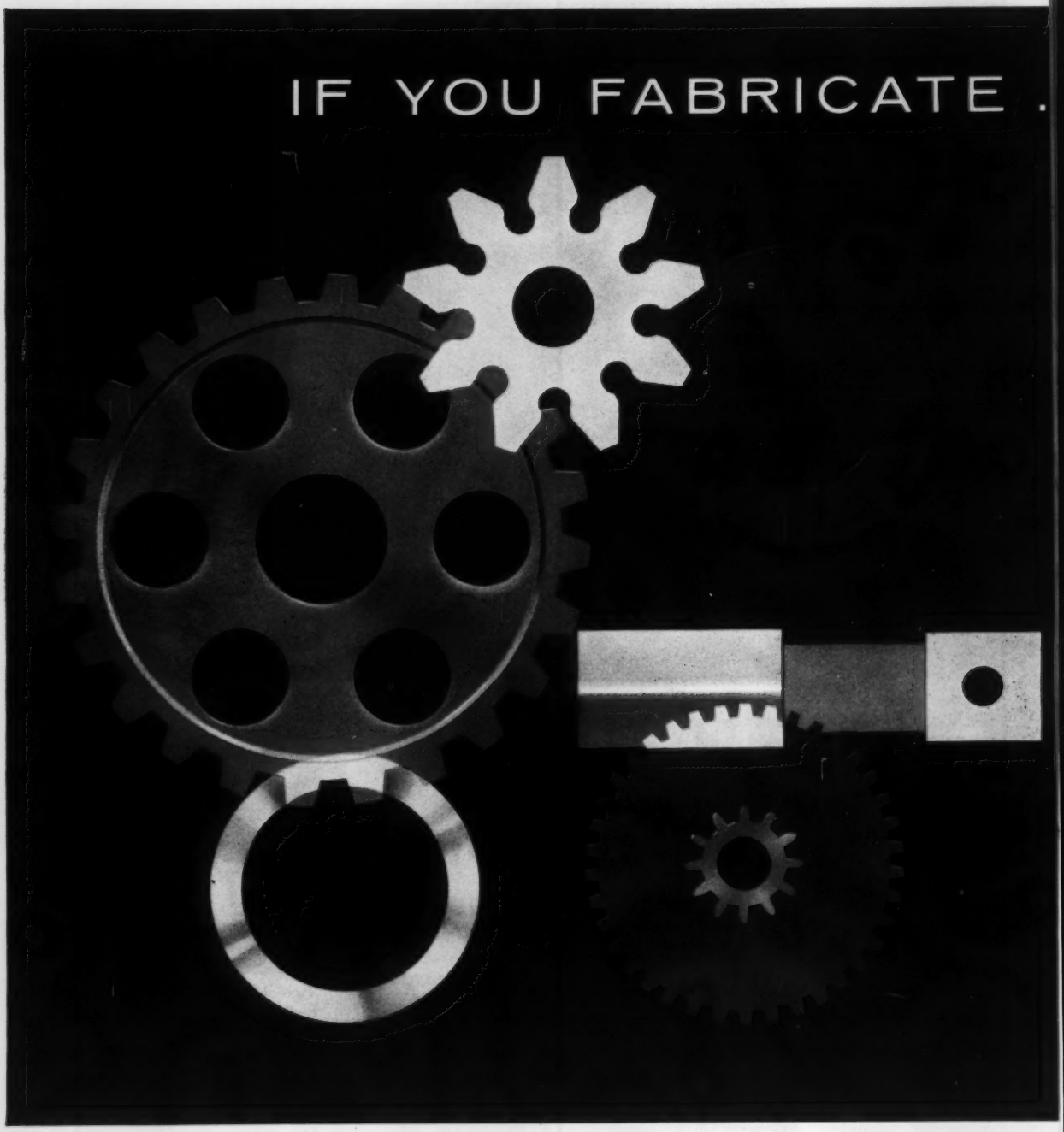
Starting at the position nearest the operator and his console control panel, the parts move through 13 stations where one end is machined complete. In the same stations vertical tools drill, face and counterbore the top.



Vee-jaws are interchangeable to facilitate holding and clamping eight different valve bodies. Platens ride on hardened ways

At the end of this line, platens are shuttled across to return up the other side of the machine. On this side, the horizontal stations, identical to those on the other side, completely machine the second end. A push broach in the last station cuts guide grooves.

Estimated cost of the machine is $300,000. The valvemaker expects to pay for it in about three years. Until May 1, it will run in Baker Bros. Inc.'s Toledo, O., plant, building valve backlog for the customer.



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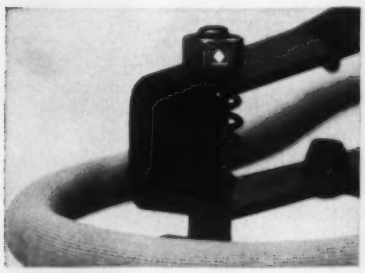
In many cases, you can make parts faster, more uniform and at less cost using Republic Iron Powder. Or, make complicated shapes which are difficult to produce economically by other means.

Republic Metallurgists can help you make the decision—help you determine iron powder's suitability to your parts. Or, they can suggest alternate methods or materials better suited to your particular needs.

Republic Iron Powder has good green and sintered strength to help you hit design targets and to simplify processing and handling. It is uniformly consistent, thanks to the qualities of base material and Republic's preparation processes. Particle size distribution and apparent density are carefully controlled. Republic's hydrogen reduction process has established acceptable limits on flow rate, hydrogen loss and chemical analysis.

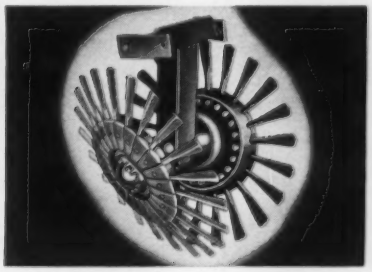
Iron powder is coming up fast. According to the Metal Powder Association, approximately 30,000 tons were shipped in 1955—a phenomenal increase over 1954. Check the coupon for more information on using Republic Iron Powder in your parts production. Or visit us at our booth at the Metal Powder Association Show in Cleveland, Ohio, April 10-12, 1956.



AN OPPORTUNITY TO SPEED ASSEMBLIES is provided by Republic "Nylok"* Nuts. These one-piece, cold-forged nuts go on fast from either end. There's no fumbling to find the right side. No special tools are needed. Feed them manually or mechanically. They provide positive locking even under severe shock, vibration and tension. Make your own test. Write for a sample "Nylok" Nut, indicating size required.

*U. S. Pat. No. 2,430,694 and pending applications.

AN OPPORTUNITY TO TURN OUT MORE on your automatics is only one reason for switching to Republic Cold Finished Steel Bars. They give your steel parts higher strength, greater hardness, a bright, smooth finish and provide top ratings on feeds and speeds, long tool life, freedom from abrasion, improved surface finish and high product quality. Available in all carbon, alloy and stainless analyses.



AN OPPORTUNITY TO DESIGN SMALLER SECTIONS to carry heavier loads with no sacrifice in strength or safety is made possible by Republic Alloy Steels. They permit the beet digger tines illustrated, to be made thin enough to penetrate hard ground. Yet they are 24% stronger than those made from carbon steel. Republic Alloy Steels resist fatigue, shock, stress and respond uniformly to heat treatment.

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Name_____ Title_____

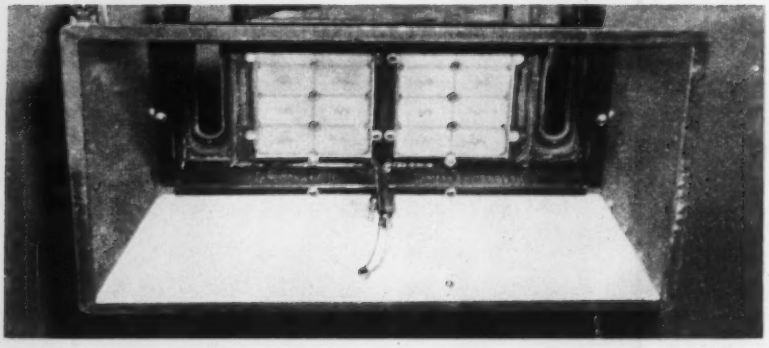
Company_____

Address_____

City_____ Zone____ State_____

This shop claims that it's first in the U.S. to use small, overhead, infrared heaters. They shine on workmen and work alike, warming both. Machinery and floors are warm, too, yet the room air temperature is often less than 68° F

Spaceheaters That Shine



Close-up of the overhead, infrared heater. Note the incandescent ceramics that give this unit its shine

THE LATEST in gas-fired, radiant spaceheaters will save you money, heat your shop or outdoor work areas more comfortably than convection-type stoves or furnaces. Like the sun, the heaters warm only objects touched by its infrared rays. The air in between isn't warmed directly; in fact, the air is much cooler than would be comfortable without the radiant heat.

First—The heaters are made by Cleveland's Perfection Industries under American patent rights granted by a German firm. Perfection reports that the first factory installation in the U. S. has just been completed at the Huron Mfg. Co., Huron, O.

This company operates the year around in a 64 x 100 ft Steelcraft building. Heat requirements for convectional methods are 1,020,000 Btu; with the infrared method, only 754,000 Btu are required—a saving of more than 25 per cent.

Installation — To determine the heat requirements, measurements are made of the floor area in square feet and added to the conventional calculations of wall and infiltration losses. The air is warmed by contact with floor and table or machinery surfaces.

Spaceheaters are furnished in combinations of two and three rayheads, each basic unit of which has an input of about 7000 Btu an hour. The largest size contains eight rayheads, has an input of 43,500 Btu an hour.

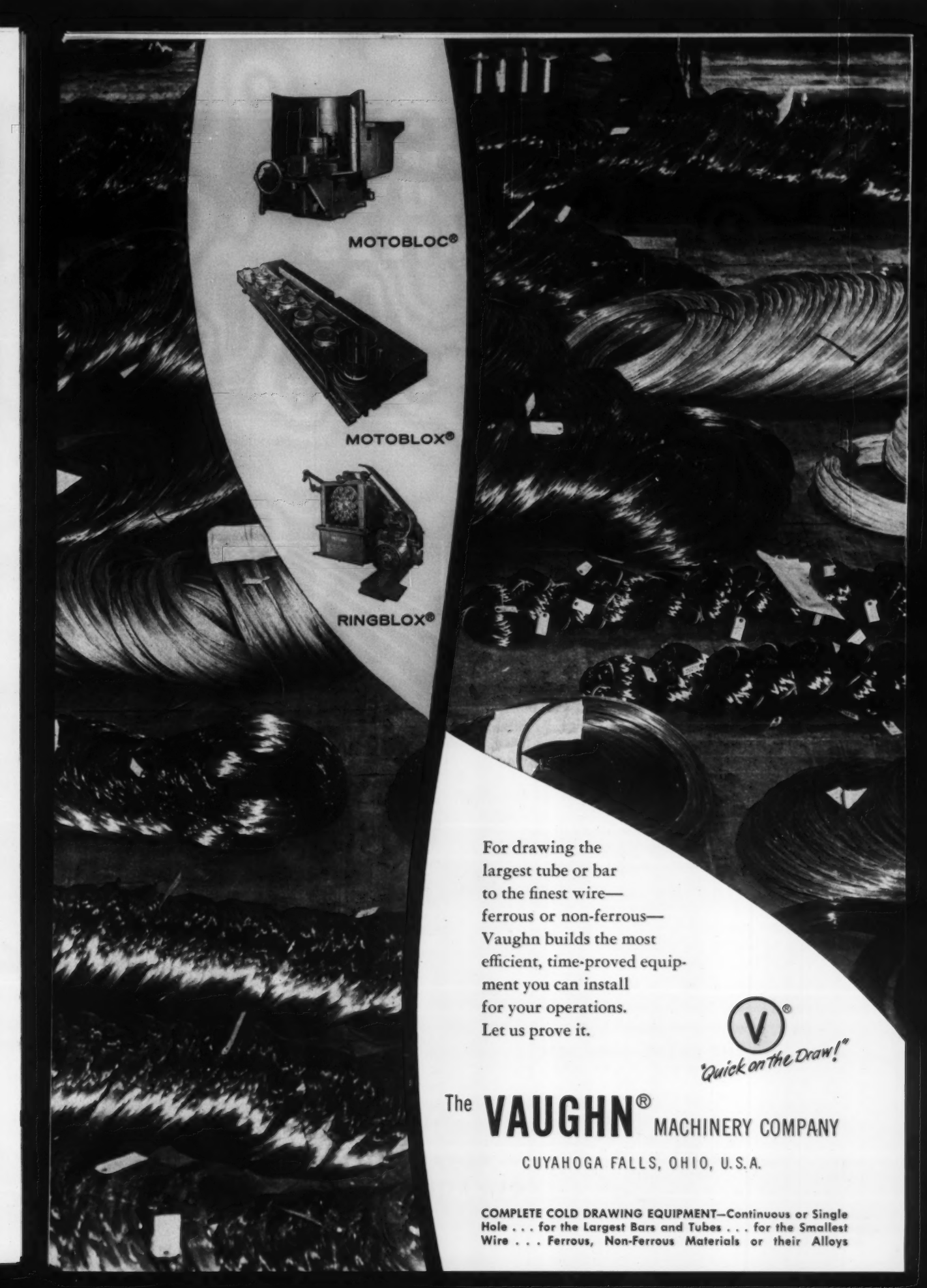
The units are usually installed overhead, in some cases as high as 37 ft. At the Huron factory, 26 two-burner heaters were used in four lines, 13½-ft above the floor.

Heaters are controlled by four thermostats, 3½-ft above the floor. These operate entirely on convection heat from the floor and work surfaces. Radiant thermostats can be used if closer temperature control is required.

Ventilation—A local heating contractor installed the 26 heaters in less than a week. Only piping and electric connections are necessary. Exhaust venting of each heater is taken care of by the normal roof ventilators. Where local building codes require it, each heater can be provided with a separate, outdoor vent.

Satisfied—V. J. Sedlon, owner-manager of the Huron, O., firm, says: "It is the ideal solution for shop heating. Sometimes, we have men working in only one part of the shop. With this kind of heating, we're comfortable without having to heat the whole place."

The first fuel bill for January, 1956, showed that it costs about $4.06 per day to keep the shop at 68°F, 24 hours a day. This is about 10 cents per degree-day.



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Vaughn builds the most
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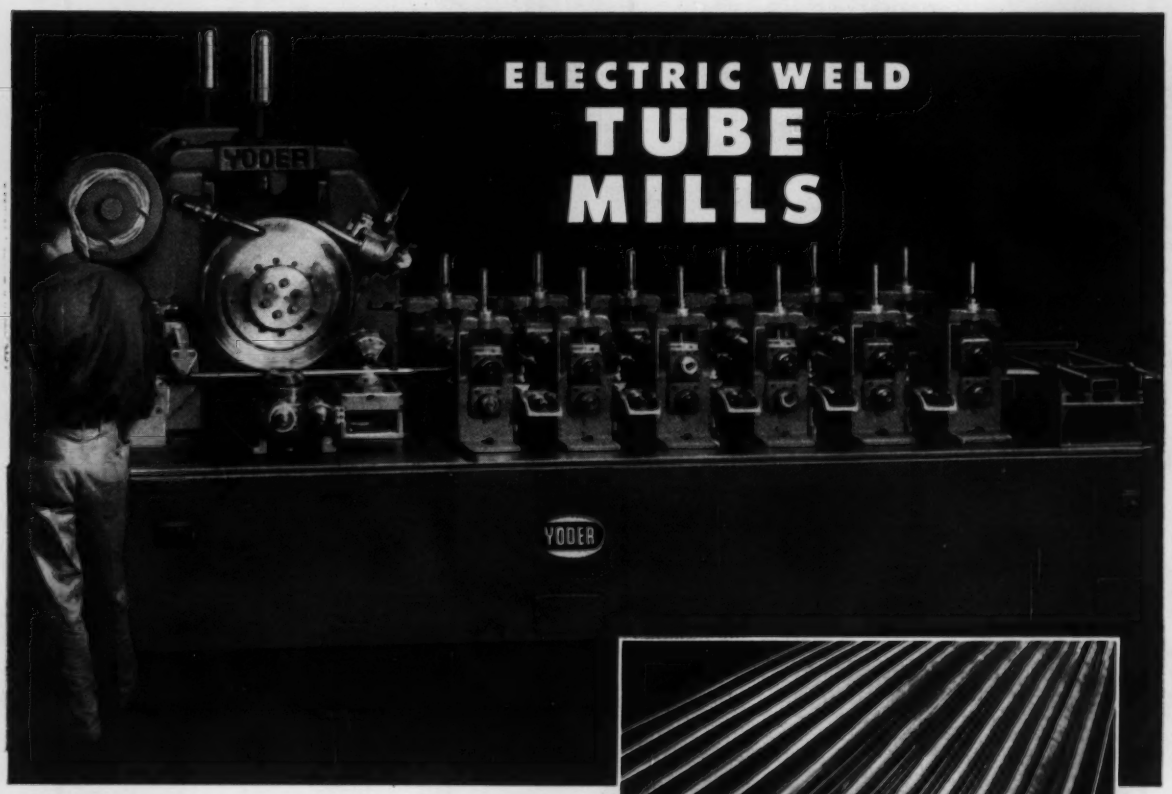
COMPLETE COLD DRAWING EQUIPMENT—Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys



The photo shows the tube forming mill and welder of a complete Yoder mill recently installed for an Italian customer. Although it looks very much like a standard Yoder mill, it embodies special mechanical and electrical innovations designed for *tube production at speeds up to 350 fpm*—from 200 to 300% faster than heretofore considered practical by the resistance-weld process.

This is just one example of the many new things introduced by Yoder in pipe and tube making equipment, to meet widely varying production needs. Other recent Yoder developments are induction weld mills for making steel as well as nonferrous pipe and tubing, at speeds never before approached by this process, and adding greatly to its recognized economic advantages.

For more complete information about the latest technological advances in Yoder tube mill equipment, write, wire or phone

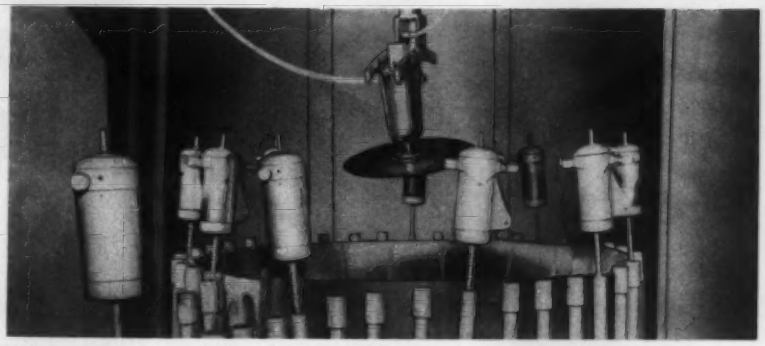
THE YODER COMPANY
5302 Walworth Ave. • Cleveland 2, Ohio

Literature on Request:

- ☐ **1.** Electric Weld Tube Mills for *Steel Tubes* up to 4" diameter.
- ☐ **2.** *Induction Weld* Tube Mills—sizes up to 8" diameter for aluminum, nickel, copper, brass, inconel, monel, stainless and other alloys.
- ☐ **3.** *Pipe Mills*—electric weld—for sizes up to 24" diameter.

ENGINEERING YODER MANUFACTURING

PIPE AND TUBE MILLS—Electric Weld
ROTARY SLITTING LINES
COLD ROLL FORMING MACHINES



Painting Mixmaster housings electrostatically brings . . .

Savings, Plus Quality

INSTALLATION of an electrostatic spray painting unit brought an 80-per-cent saving on paint to Sunbeam Corp., Chicago.

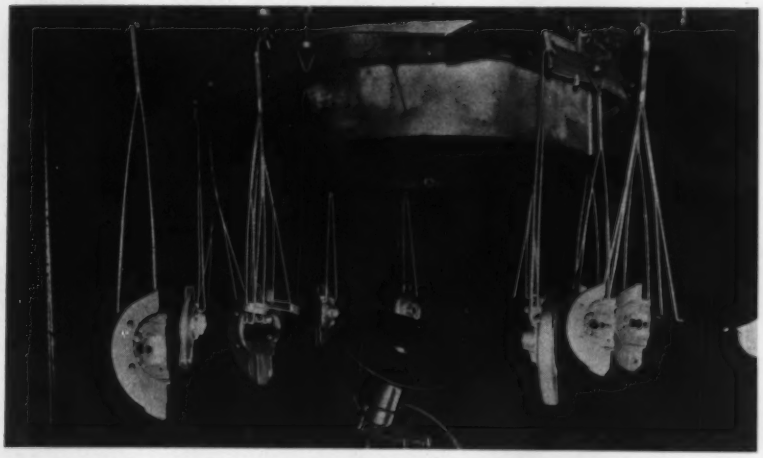
The white finish of the Mixmaster is put on electrostatically. Four hand sprayers are used to retouch recessed areas of the housing and cover, which are turned out at better than 300 an hour. Eight hand sprayers were used formerly.

Procedure—Parts to be painted are placed on a spindle-type, floor conveyor. It makes a loop around the atomizing disc of the Ransburgh No. 2 Process unit, which is mounted overhead. The spindles rotate in the painting area.

Paint is metered to the center of the whirling disc and flows evenly to the outer edges. A strong electrostatic field is created between the disc and the parts to be painted. The force of the field transforms the paint into a spray of fine, charged particles, which are attracted to the grounded parts on the conveyor.

Other Parts—Sunbeam also uses the process to paint the base of its deep fat fryer, a lawn sprinkler base and two lawn mower parts, the casting and handle. Floor-mounted discs are used here.

Parts of three hardware items, a drill, saw and sander, are coated with clear varnish by the electrostatic process.



Upper guards of Sunbeam electric saws are hung on fixtures on 12-in. centers. Fixtures rotate as the conveyor loops around the stationary electrostatic spray painting unit which applies a coating of clear varnish

Research in 1956

DURING the coming year, industrial research will almost reach the $10-billion mark. This huge sum will be spent, says Dr. Eugene Weiner, vice president and director, Horizons Inc., in four main fields: The transition metals (rare earths), graphic arts, powder metallurgy and foundry practices.

The Atom—The most pressing research will be with titanium, niobium, tantalum, hafnium and the others that make up the rare earth family.

Fuel elements for reactors will be a top priority item. Reprocessing fuel elements is a laundering problem. Less than 1 per cent of the fuel degenerates or is burned. The best way to remove the poisons still is undiscovered.

Hafnium and zirconium must be adapted for structural and control elements in nuclear reactors.

The rare earths are hard to separate from the ashes of nuclear reactions. As soon as this can be done economically, industrial and commercial uses will follow.

Titanium—This metal is being widely used, but often it's too brittle. Scrap is difficult to recover. One possibility: Powder metallurgy.

There are two competing avenues for this development. One is the powder technique; the other is fibrous metal.

To produce fibrous metal you use short fibers, rather than fine powder. With the fibers running in the same direction (the length of the piece), slender parts become quite flexible without a sacrifice in strength. Sheets can be made with the fibers intertwined like hemp fibers in a rope.

Foundry—Better molding sand is one objective. One project wants to find a mixture that contracts when hot and expands when cold. Better binders are included in the program to reduce gas inclusions, blowholes and porosity.

The graphic arts need a method of photographic reproduction that will keep the quality of the lithograph or engraving and cost less. Also needed is a faster means of reproducing electronically stored and computed information. Present methods use expensive or troublesome chemicals; some method of dry reproduction is being sought.

Save 60% set-up time!

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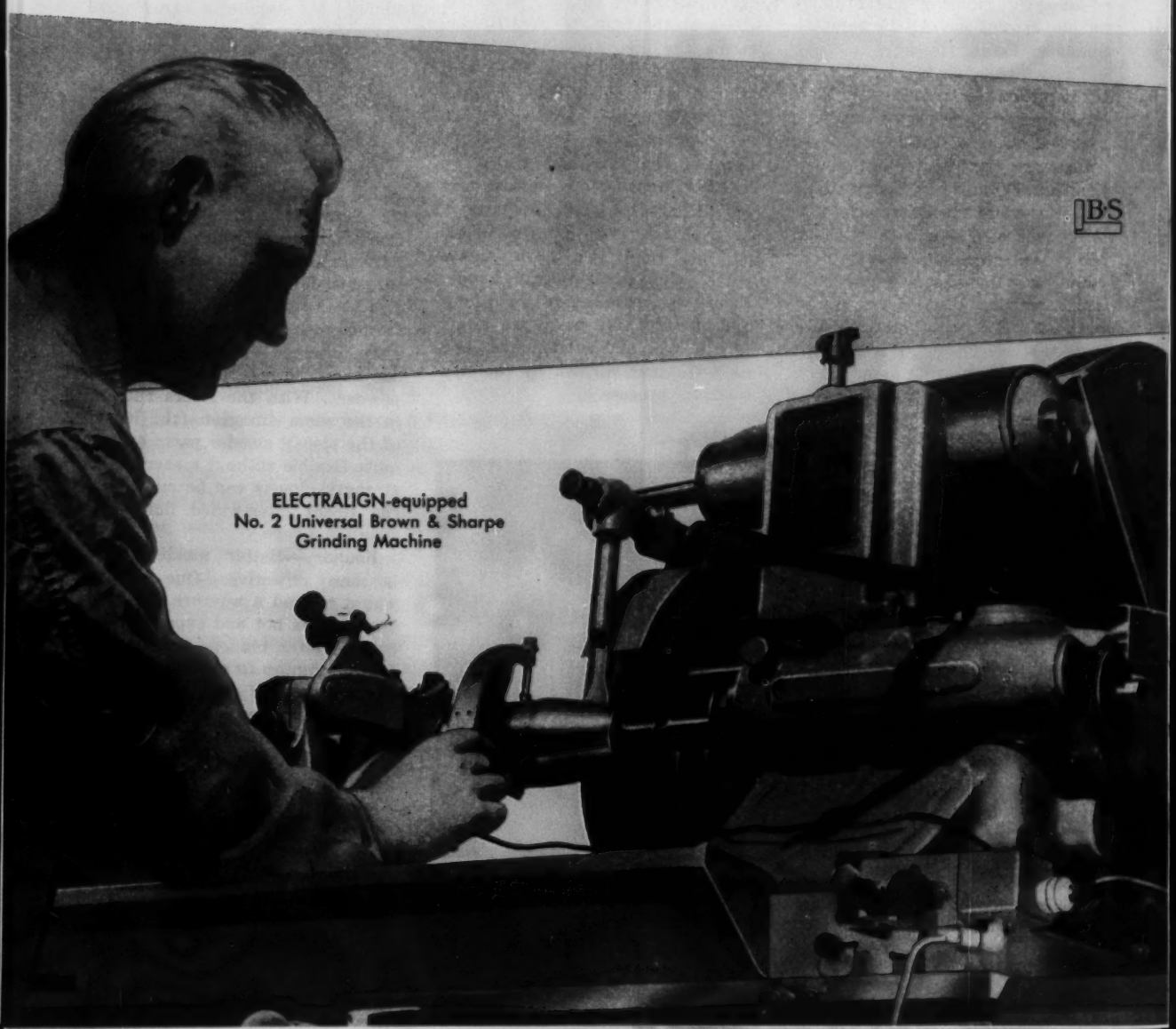

ELECTRALIGN-equipped
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repeat size to tenths!

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ELECTRALIGN® provides instant alignment to 0.0001" after only one preliminary grind . . . without calculations. Operator merely sets dial to working length of piece and adjusts pointer to show taper error. Then he swivels table until pointer reads zero, and grinds to finish . . . with practically full tolerance for sizing! And size control to 0.0001" is a cinch with ELECTRALIGN's precision electronic caliper. Operator can easily measure pieces to 0.00001" . . . often right in the machine!

ELECTRALIGN GRINDING speeds set-ups, steps up productivity, minimizes spoilage — radically reduces costs in tool-room and production work. Write for complete details. Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

ELECTRALIGN can be used for either alignment or gaging merely by turning selector switch. This modern electronic aid to precision is available on all Brown & Sharpe Universal and Plain Grinding Machines and the No. 13 Universal and Tool Grinding Machine.

Test Ceramic Tips

WHERE ARE the ceramic tool bits that Norton Co., Worcester, Mass. announced last summer? "Much alive," says the company in a progress report, but they aren't available yet except in experimental quantities.

More results from the more than 200 field tests under way are needed. Types of clamp tool holders and tool geometry still are open questions. Here's what tests to date show:

Results — Performance appears to be better in rigid machines with plenty of power and high speeds. Superiority also has been indicated at normal carbide speeds. The tools require rigid tool holders which will hold the bit under a minimum of clamping stress.

No successful method has been devised which will fasten the bit to the tool holder by cementing or brazing. Experiments are being conducted with throw-away type bits which are clamped in place. These smaller tools permit taking cuts in places where tools of larger cross section will not fit.

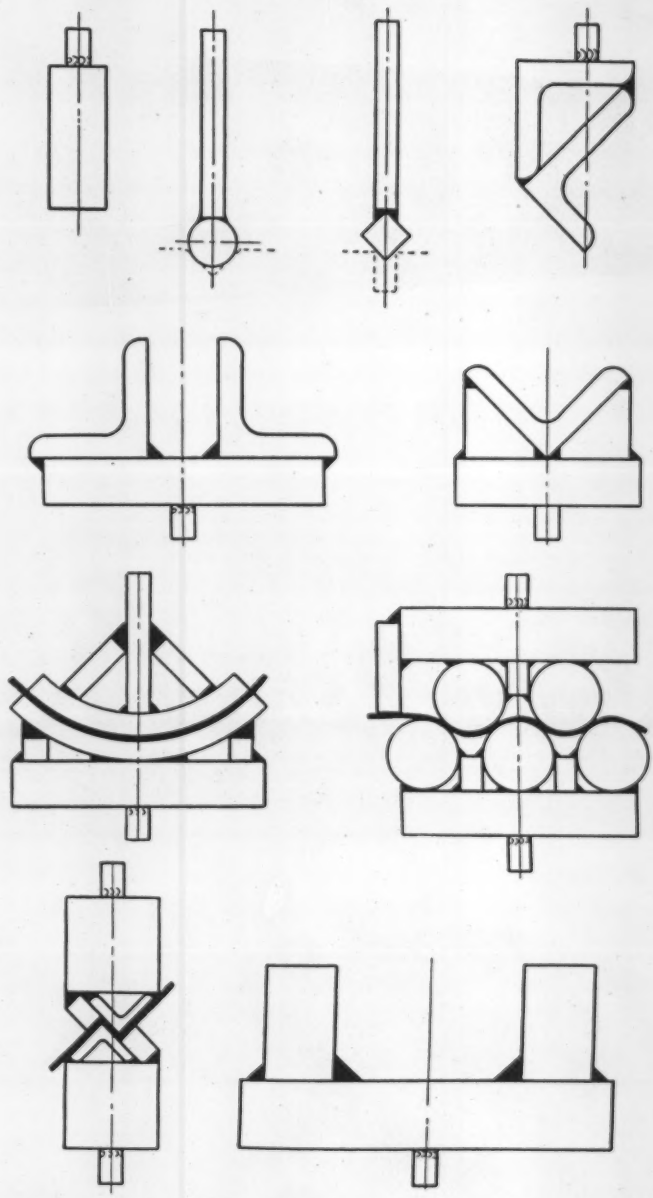
Case History—A large machinery manufacturer is machining large gear blanks from 4620 steel. Blanks are 29 in. OD, 12 in. ID and 15 in. long. At 850 sfm two cuts were taken on the 15-in. length of the OD.

The first cut was with 0.020-in. feed and 0.140-in. depth of cut, the second with 0.015-in. feed and 0.015-in. depth of cut. One end of the blank was faced with a second tool at speeds from 350 to 850 sfm. The first cut was 0.140-in. deep with 0.022-in. feed and the second cut 0.015-in. deep with 0.015-in. feed. No coolant was used.

Performance—A 120 microinch finish resulted. Both tools machined six parts before resharpening was necessary, a total of over 90 minutes of machining time for the turning tool and over 50 minutes for the facing tool. On this job, tungsten carbide tools are expected to machine for 25 minutes at the same depth of cut, a 0.030-in. feed on the first pass and at 350 to 400 sfm.

DO-IT-YOURSELF

Dies for Pressing Problems

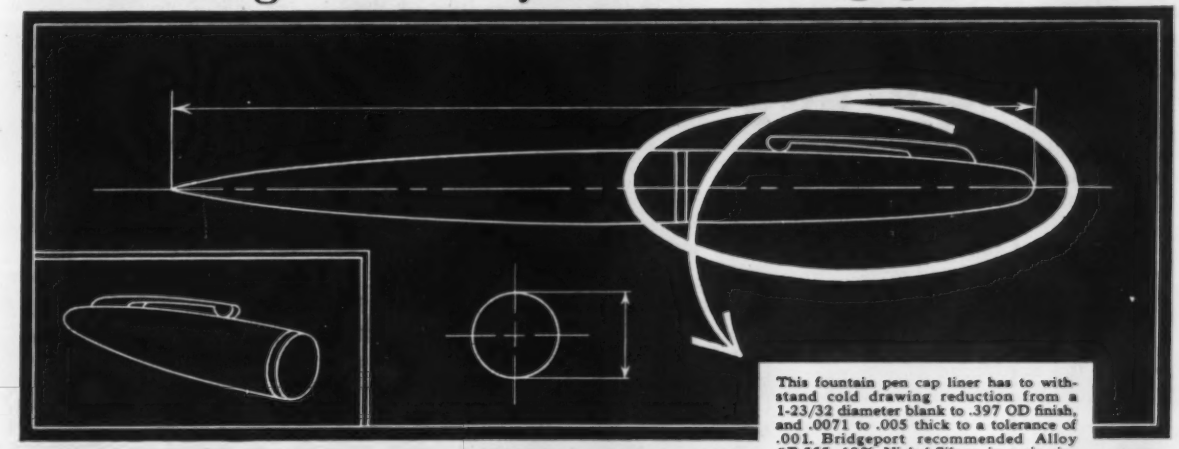


SOMEDAY you may find that you need a special press brake die for that hurry-up job. Here are a few do-it-yourself possibilities dreamed up by the Cincinnati Shaper Co., Cincinnati.

Usually, these dies can be made from scrap materials that are available in all shops. Quite naturally, dies of this type do not ordinarily have a long life. However, they are inexpensive and easy to make.

Use a V-die or slot in a filler block for alignment of male dies.

Matching metal to job with Bridgeport alloys



This fountain pen cap liner has to withstand cold drawing reduction from a 1-23/32 diameter blank to .397 OD finish, and .0071 to .005 thick to a tolerance of .001. Bridgeport recommended Alloy #F-565, 18% Nickel-Silver, in grain size and temper developed by Bridgeport for applications of this type.

Parts made by Advance Stamping Co., Detroit, Mich.

For better stamping, drawing, cold forming... Bridgeport **HIGH I. Q.*** Strip and Sheet

Let Bridgeport match the metal to the job! Tell us your requirements—both working and service properties—and our Technical Service will be glad to recommend the right Bridgeport High I.Q. alloy for the job. The right alloy may help you cut production costs and produce a better product. Call your Bridgeport sales office today for a metal recommendation to fit your specific needs.

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Tool Engineers' Convention

Program Control, a Prediction

NUMERICAL CONTROL will be used in the machining of low volume parts by manufacturers in the future. A number of the systems, using punched cards, punched tape and magnetic tape, are available.

Outstanding features are easy storage and automation. The system resembles the well-known preset positioners, cam packages, templates, etc., but it has these differences: 1. Planning and setting can be done remotely in an office or drafting room. 2. Plans can be stored or filed.

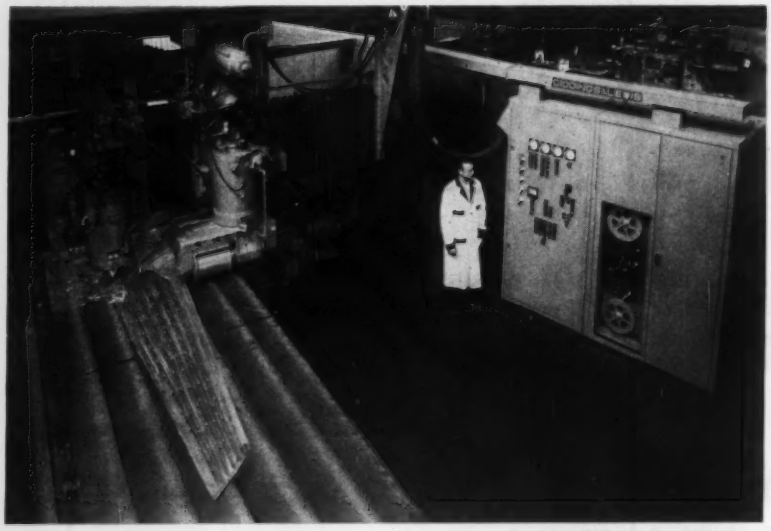
Application—Test programs at Massachusetts Institute of Technology show that you can save money by using a memory control system on small milling machines. The Air Force has made the observation, based on tests at Giddings & Lewis Machine Tool Co., that skin milling with this system is 3-to-1 better than hand-controlled skin milling. An F100 horizontal stabilizer is being produced by punched tape control at less than half the cost of the former method.

Types — Numerical control can be divided this way:

1. Systems for machines with separate position and rate controls. 2. Systems for accurate co-ordinate, rate and position controls (variable path control).

The first system is used for drilling, boring, turning, etc. The second is more useful for the more complicated operations, such as profile milling, roll forming and spinning.

Both systems are further subdivided into: 1. Those which rely on an operator to control the machine. 2. Those which do not use an operator but operate from a prepared tape or similar memory system.



This aircraft wing member gets its dimensions from the numerical control system shown at the right. One authority predicts that such controls will be used for small runs

Numerical Control — The Giddings & Lewis Numericord system operates from a punched paper tape. All operations normally performed by the materials specifier, tool designer, machine specifier, time study man, manufacturing supervision and machine operator, are completed by a group of trained engineers and office assistants called a programming group. It designs the operations and stores the information on a punched tape, which, in turn, operates the machine through servomechanisms.

There are some limitations to the immediate widespread use of numerical control. Machinery needs better servomechanisms and greater freedom from geometric errors. Wear must be reduced, and distortion due to temperature change must be corrected. Work blanks must be of better quality. Tooling must be more uniform and interchangeable. In short, machinery must be designed for a numerical control system.—*Jesse Daugherty, consultant, Hypro Products, Giddings & Lewis Machine Co.*

Grinding with Electricity

ELECTRICAL discharge grinding promises to revolutionize many phases of metalworking.

Heat Checking — Carbide cutting tools sharpened by conventional methods frequently crack. Such cracks are practically invisible; etching and a microscope are needed to reveal them. Electrical discharge grinding sharpens the tool without heat checks or cracks.

Rate—On small sections (1/16 x 1/16 in.), metal is removed more slowly than on larger sections. The limiting factor is the ability of the piece to carry electricity. The

"Numerical control will be used on short runs." "Electrical discharge grinding promises to revolutionize metalworking." Those predictions were made by top authorities at the recent Tool Show in Chicago. Here are reports on several papers which were presented at the meeting

limit on larger pieces is power.

The Elox Corp. of Michigan gives rates of removal from 0.0025 to 0.008 cu in. a minute.

Present electrical discharge equipment requires a substantial investment which can only be justified by a large volume of tools, say 100 a day.

The cost of metal removal by the discharge method is about $3 for each cu in. of carbide. Since the operation is automatic, the only labor required is for setup.

Tool Life—The life of a tool sharpened by electrical discharge improves from 30 per cent for heavy, rough cuts to nearly 800 per cent for the finer cuts.

Tools will show a rougher surface than those sharpened by conventional methods, but the absence of cracks accounts for the improved life.

Wear—The brass wheels used in electrical discharge grinding wear faster than diamond wheels. Compensation devices correct for wear.

Little pressure is needed to hold the work.

The process is a natural for automation.—*V. E. Matulaitis, director of research, Elox Corp. of Michigan.*

We Need Better Tool Life Tests

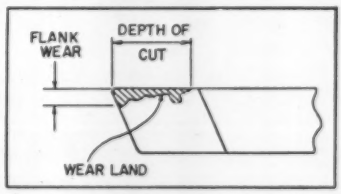
TOOL engineers can be of great service to industry by finding more adequate ways to measure metal-cutting performance. There has been progress, but no single test is completely acceptable.

Variables—These factors affect tool life:

1. The machine—type, condition, etc. 2. Work material—analysis, shape, hardness, strength, elasticity, etc. 3. Cutting tool—material, treatment and shape. 4. Cutting fluid—type, properties, method of manufacture and application. 5. Cutting conditions—speed, depth, feed and shape.

Present tests and methods of tool study are based on one or more of these factors: 1. Life of the cutting tool. 2. Cutting tool forces. 3. Surface quality of the finished work. 4. Power consumed during machining. How important each one is depends on the measuring system.

Tool Life—There is little agreement on measuring tool wear. A single-pointed tool will fail because of flank wear, top face wear or a combination of both. One method increases the cutting speed until the tool fails within a given time. Historically, the time is 20 minutes; today, 1½-hours is more practical.



A cutting tool doesn't need to be resharpened until this amount of wear occurs on the flank. It's one method of measuring tool wear

Tool life can be determined by measuring the time to total failure. Generally, other end points are used, such as flank and face wear. Linear wear of 0.030-in. on the flank is failure for carbide tools; 0.060-in., or total destruction, is used for high speed tools. Wear tests on tools show that wear is highest at first but levels off to a lower, consistent value. A shop microscope, Brinell microscope or any other 10-20 power instrument with a graduated reticle is used to measure land wear.

Irradiated cutting tools are used successfully in the measurement of tool wear. The amount of radioactivity in the chips indicates the amount of tool wear. This is called the radiometric method.

Tool Forces—The second general method measures tool force. One system uses a strip, bonded to the workpiece and connected electrically to a dynamometer. Increased effort in cutting changes the resistance of the circuit.

Still other types use pneumatic or hydraulic dynamometers connected to recorders. Changes during the cutting are recorded automatically.

Others—At one time, the amount of power consumed was important as a measure of tool wear. Still another test was the surface finish left by the cutting tool. Because of its interrelation with certain metallurgical factors, it is not a good test.

Another promising direction is the use of the analog computer. Given the readings of 13 variables, it will solve for the unknown fourteenth. It will also consider five variables which affect the motor horsepower and give information on one of them when the other four are known.—*F. J. Daasch, chief machinability engineer, Rock Island Arsenal Laboratory.*

Diamonds—Cheaper by the Batch

TIME WAS when shaped diamond tools were produced in small quantities by experienced men. Diamonds had to be large enough for easy handling and orientation, and had to suit conventional shaping methods.

The war changed that. Today, in England, we produce several standard types of diamond tools with batch production methods.

Postwar—The immediate postwar period brought experimentation to expand production and sales. Investigation was along these lines: 1. Labor. 2. Production methods. 3. Standardization. 4. Machine tools. 5. Jigs and fixtures. 6. Built-in accuracy devices. 7. Markets. 8. Organization.

Here are the results:

Labor—You can't use casual or irresponsible labor to make diamond tools.

We have found that handicapped

men make the most successful workers. Eighty per cent of our diamond shapers were disabled in World War II.

Methods — The biggest single methods improvement was in the use of powdered metals. When possible, diamonds are set in the rough state. This preset tool is then transferred to the shaping department.

Standardization — British standards were set in 1943 by a technical panel. As the users adopted them, attention focused on machining operations. Rolls-Royce, for example, reduced 27 types of diamonds to five. Standards also have been set on Diaform attachment chisels, Matrix thread grinders, Excello blade root grinders, and probes for British surface measuring instruments. These standard tools form the bulk of production at L. M. Van Moppes & Sons, Ltd.

Jig and fixture development has been satisfactory; the use of optical equipment gave us accuracy without having to remove the work.

We encouraged standardization by publishing data sheets that featured the tools that could be offered for less.

Finally, we reorganized the plant into a batch production system. True, in-line, highly automated production was avoided partly because diamond tools are easily moved. We anticipate installing a light overhead conveyor. *—N. R. Smith, director, L. M. Van Moppes & Sons, Ltd.*

Tooling for 50,000 Tons

THE MODERN, jet aircraft needs many large, complex forgings. To produce them, Alcoa uses 35,000 and 50,000-ton, hydraulic presses, which are 128 ft tall.

They are exceptionally difficult to tool. Conventional forgings use pressures of 10 to 20 tons per sq in. Since these enormous presses were designed, forgings are being specified with exceptionally small fillet and corner radiuses, thin webs and ribs and close tolerances. Forging pressures of 30 to 40 tons per sq in. are necessary.

Problems—Conventional methods of die sinking with machine cutters can't be used. Dies are made of a series of accurately machined inserts, held tightly in a yoke or holder. Butted surfaces must not permit leakage when full pressure is applied.

No draft forgings are hard to knock out without distortion. To overcome this, whole inserts are used as knockouts.

Temperatures — Accurate forgings require close temperature control. The most accurate forgings are produced when the die temperature is closest to the work temperature. This creates lubrication problems because the dies are being operated at 800°F.

Mismatch is controlled by keeping the die rigid, guiding the holder and the die. Also, counterblocks and guide pins are used in the dies. Temperature control of the die permits a minimum clearance between guide pins and counterblocks.

Straightness — Controlling straightness is more difficult in forgings with little or no draft because straightening dies cannot be used after heat treatment. Twisting mechanisms and holding fixtures are used.

Normal dies can be sunk to plus or minus 0.005 to 0.010-in.; dies for a 50,000-ton press must be accurate to plus or minus 0.001-in.

Cast dies have not been successful for large parts.—*A. E. Favre, chief production engineer, Forging Division, Aluminum Co. of America.*

Why Specify Surface Finishes?

THERE IS no universal or best way of specifying surface finish. It depends on the material, production method, operating deflection, mating parts and uniformity.

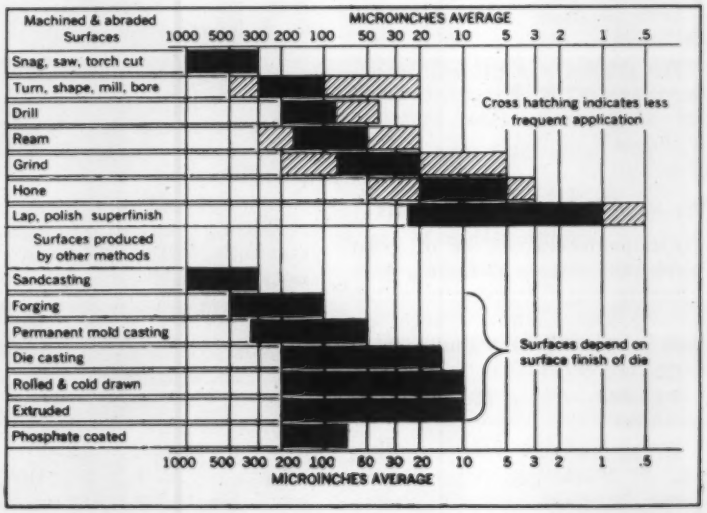
The purpose of surface finish is to obtain the correct operating fit with a mating part in the shortest time with the least wear (commonly known as the break-in period).

Measurement—Sight and touch are only fair instruments in determining the finish of similar surfaces. They are misleading when comparing different materials and processes. Sample parts help to eliminate errors in judgment; a better way is the surface measuring instrument.

Status — Early superfinishing was much finer than necessary. Experience and experiment have reduced and changed specifications in the automotive industry. Here is a comparison:

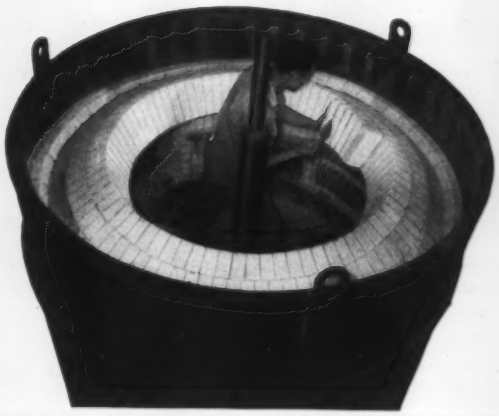
Part	*Original Spec.* (microinches rms)	*Present Spec.* (microinches rms)
Piston skirts	5–25	60 max
Brake drums	4–6	120 max
Cam contours	3–12	20 max
Tappet barrels & Heads	2–4	12
Cylinder bores	12–16	20–35
Piston pins	1–2	6 max

Sharp peaks and valleys make poor bearing surfaces. Plateaus separated by depressions are good bearing surfaces. The depressions



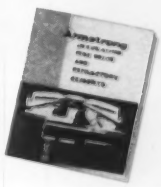
This graph compares the surface finishes of the more common production methods

Domes... cut installation costs up to 25% with "tailor-made" domes of Armstrong Insulating Fire Brick

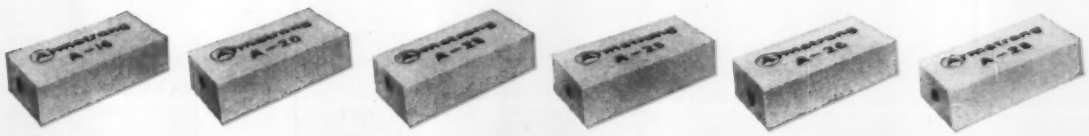


Precision-cut at the factory, "tailor-made" domes of Armstrong Insulating Fire Brick are accurately machine-cut for perfect keying action, non-slip fit, and ease of handling. These domes are strong and stable, can be laid up so quickly that installation costs are cut by as much as 25%. Armstrong engineers will design domes for you without extra charge. They need know only the diameter, rise, thickness, and type of brick.

Get free booklet giving full details on the complete line of Armstrong Insulating Refractories. Address Armstrong Cork Company, 2703 Reed Ave., Lancaster, Pa. For help on any furnace lining or building problem, call your nearest Armstrong office.



Armstrong INSULATING REFRACTORIES



act as reservoirs for local wear, heat dissipation and wear debris.

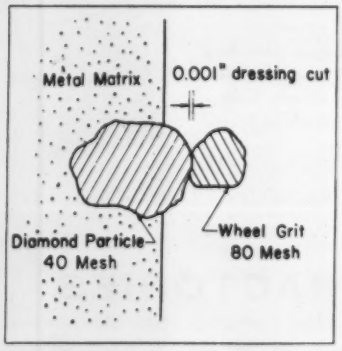
Superfinishing provides the ideal wear surface, but production conditions usually interfere, leaving a false mating contour. Other types of machining used do not leave the ideal wear surface. This is unimportant because the break-in period leaves the wear surface desired.

Operation — Simply specifying the operation does not specify the roughness of the surface. A good example is the rocker shaft. It is machined like a piston pin, through a series of centerless grinds and a final lap. The final finish is satisfactory at 25 microinches, compared with the piston pin's 6 microinches. It is safer to specify a range of acceptable roughness.— *Dr. C. R. Lewis and A. L. Thomson, Chrysler Corp.*

CDP Diamond Tools

DIAMOND POWDER, plus powdered metal, make a tool that dresses grinding wheels to exact dimensions. The term CDP means cemented diamond particles and is used commercially to describe dressing tools made from diamond powder held in a powdered metal matrix.

Particle Size—CDP dressing tools must be carefully selected to match the grit size of the grinding wheel it is to dress. If the diamond particles are too large, the wheel will squeal and glaze, and the dressing will be poor. If the diamond particles are too small, the dressing action will undercut them too quickly and increase tool wear.



Cemented diamond particle (CDP) tools must be selected for each wheel grit. This is the ideal relationship of particle to grit

Only experience with the wheel, the machine, the material being ground, finish specifications and dimensional changes will provide the answer to the correct CDP dressing tool.

In general, particle size should be twice the diameter of the wheel grit, and the cut depth the minimum that will provide a free cutting surface.

Design—These are the major points to consider: 1. Diamond particles must be of good quality. Inferior grades decrease tool life. 2. Diamond particles must be uniformly distributed in the matrix. 3. Diamond particles must be chunky rather than elongated. 4. The metal matrix must hold the particles securely, yet permit enough erosion to expose more diamonds. 5. The size of the diamonds must be uniform. Large particles cause glazing; small particles undercut too easily and fall out.— *Dr. C. L. McCabe, consultant, Koebel Diamond Tool Co.*

Controlling Surface Finish

THESE are the techniques used to control surface finish:

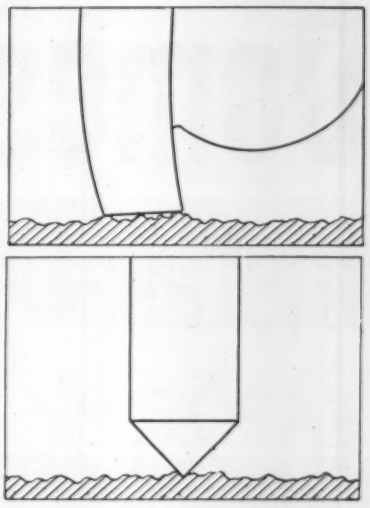
1. The fingernail. 2. Tactual (touch) specimen. 3. Appearance (the eye). 4. Reflectivity meter. 5. Air gage. 6. Normal and taper section. 7. Shadow microscope. 8. Interference microscope. 9. Stylus profiling equipment. 10. Stylus averaging equipment.

Types—The most common and antiquated measuring device is the fingernail. It is a poor one because it cannot bottom the irregularities of a surface. Judgment is fallible. Also, no one can describe or define "feel."

It helps to use the tactual specimen. Operators can use them for comparison. Still, they can't be labeled or defined on a blueprint.

Visual or appearance checks of surfaces are unreliable. The eye will find surface flaws and scratches about 0.001-in. deep.

Instruments — The reflectivity meter is a triangular arrangement of a light source, a sensing element and a specimen surface. The light shines first on the meter; the meter is adjusted; then the light is turned on the specimen; and the amount of light reflected is measured, which does not always correlate with the height of the surface irregularities.



Although widely used, the fingernail (top) is a poor, unreliable indicator for surface finish. The diamond stylus (below) gets to the bottom of things, makes a more accurate trace of surface irregularities

Air gages measure surface irregularities in terms of air leakage. Such equipment is limited to flats or large diameters. Also, a single bump will give a larger reading than a depression of the same dimension. Air gaging is poor for averaging, but is excellent for checking surfaces used for seals.

Microscopes—There are three techniques that use microscopes—normal sectioning, taper sectioning and interferometry.

Normal sectioning uses a cross section normal to the surface and measures the heights of the irregularities.

To get a better look without increasing the magnification, taper sectioning is used.

Sectioning ruins a part, so a shadow technique can be used. The idea is to cast a shadow on the part and note how it deviates from a straight line.

The interference method is the best of all microscopic techniques. Specimens must be highly reflective. A fringe pattern is cast on the surface and observed. If the surface is smooth, the fringes will be evenly spaced lines. If the fringes as observed are not straight, the height of the deviations can be measured.

In general, microscopes are

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uniform in handling ease
versatile in application
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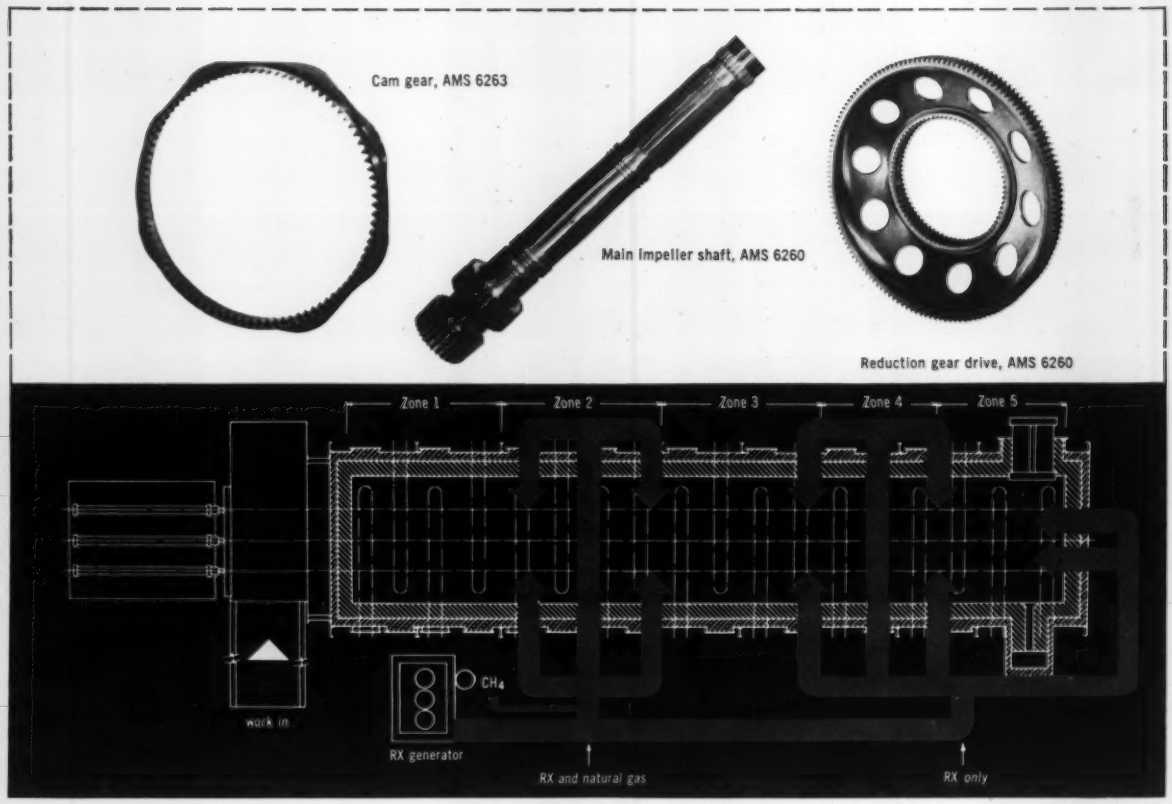

Surface split manifold arrangement which permits controlled variation of carbon potential in different zones of a continuous furnace, using a single RX® generator

'Surface' carburizing holds aircraft tolerances

When your heat treating and inspection standards are tightened to "aircraft quality," it's time to specify 'Surface' precision gas carburizing. It will give you close tolerances and bonus benefits as well—as the manufacturer of these aircraft gears discovered.

A 'Surface' continuous gas-fired furnace, with controlled atmosphere, delivers accurate metallurgical results on every part, the first time. In addition, the furnace can simultaneously process different steel analyses with different case depths. The operator simply varies the automatic cycle intervals on three rows of work trays. Furnace mechanization minimizes operator attention and parts handling—assures that each piece receives the prescribed time-temperature cycle.

Ideal case carbon gradients are achieved by the unique split manifold distribution of atmosphere from a single RX gas generator—a typical example of 'Surface' know-how working for the user.

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also makers of Janitrol automatic space heating and Kathabar humidity conditioning units

limited to flat surfaces or those with radiuses that will fit under or on the microscope. Plastic replicas are used in some applications.

Styluses—There are two stylus techniques—total height, usually a chart record, and average, usually shown on a meter.

Styluses are versatile. The profilers show surface irregularities from 2 microinches up. The averaging equipment is the accepted standard: Root mean square.—*C. H. Good, production engineer, Micrometrical Mfg. Co.*

What Is a Soluble Oil?

SOLUBLE OILS have developed from a specialty into a rank and file member of the family of cutting fluids in the last 15 years.

A cutting fluid must: 1. Dissipate heat. 2. Lubricate and reduce friction. 3. Leave a satisfactory surface finish. 4. Prolong tool life. 5. Prevent rust or corrosion. 6. Carry away chips.

Development—Mineral oils lubricate better than water, but they do not dissipate heat. Water dissipates heat well, but it does not lubricate. Combining these two is the theory of a soluble oil.

Combining them cannot be done perfectly, and some compromises must be made.

Soluble oils generally are water-in-oil emulsions. They act differently from straight mineral oils and must be handled with more care. Here are the principal parts of a soluble oil: 1. Mineral oil. 2. Emulsifiers. 3. Additives. 4. Coupling agents and solvents.

Of first importance is the character of the mineral oil. All other ingredients must be selected to provide good stability. Viscosity depends on the application.

Emulsifiers are selected on the basis of compatibility. These are alkali soaps of sulphonic, carboxylic and rosin acids.

Additives give soluble oils the attributes of mineral cutting oils. They also improve rust protection and inhibit bacteria.

Coupling agents or solvents are used to bind the mixture, to make it homogeneous, lower its viscosity and improve the pumping ease. The acid or alkaline condition of the

New "PG" Wheel hikes production 40%

1. PRODUCTION PROBLEM: The Albert Plating Works of Brooklyn, N.Y., in one of its operations, bends, finishes and plates cold-rolled steel tubing chair backs. The finishing procedure—removing stretch marks and blending the steel surface prior to plating—was formerly a two-step job: grinding with a Grit #180 set-up wheel, then surfacing with a grease-coated stitched buff wheel. Production was slow and costs high because of constant wheel dressing.

2. SOLUTION: A 3M Representative suggested that this company switch to the amazing new "PG" Wheel, Grit #320. The "PG" Wheel, lubricated with tallow, replaces *both* the set-up wheel and the buff, and has increased production 40%. Down time is cut to the bone because each "PG" Wheel lasts a *full week*. Too, the "PG" Wheel produces a far superior finish on the tubing, making a superior and more consistent final chrome-plated surface.

A 3M Representative can help you solve your grinding and finishing problems, too. Call him today.

3M ABRASIVES

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☐ Send me full details about the amazing new "PG" Wheel
☐ Please have 3M Representative call

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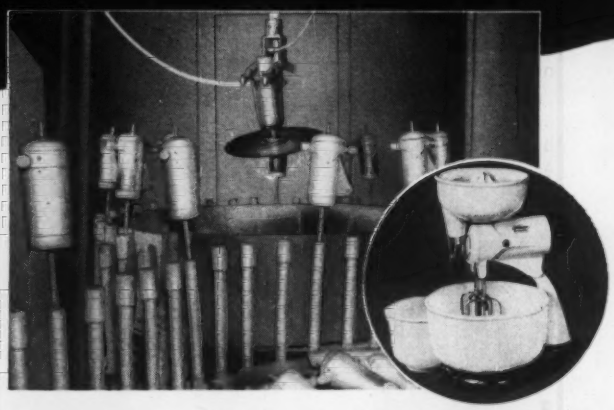
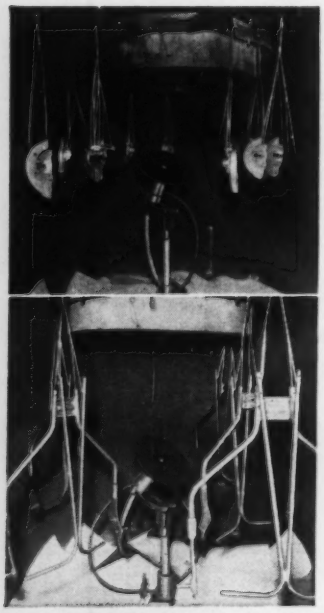
Made in U.S.A., by MINNESOTA MINING AND MFG. CO., St. Paul 6, Minn. Also makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "3M" Abrasives, "3M" Adhesives. Export Sales Office: 99 Park Avenue, New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

3M COMPANY

Sunbeam is particular about the uniform high quality finish on their products, so SUNBEAM relies on RANSBURG NO. 2 PROCESS Electrostatic Spray Painting



Along with improving the quality of the brilliant white finish on Mixmaster parts, an 80% paint savings was achieved when SUNBEAM switched from hand spray to RANSBURG Electrostatic Spray Painting



Protective clear lacquer is applied to upper saw guard (upper left) with RANSBURG NO. 2 PROCESS on this line in SUNBEAM's plant 2, Chicago. Other hardware items, including the Drillmaster and Sunbeam Sander are lacquer-coated electrostatically here. Lawn mower parts, such as the handles shown (lower left), the Rain King lawn sprinkler base, and the Sunbeam Fryer base also are painted efficiently with Ransburg No. 2 Process Electro-Spray.

Regardless of the type of product you manufacture, if it's painted—and if your production justifies conveyorized painting—you should look into the savings and improved quality which can be yours with one of the Ransburg Electrostatic Processes. May we tell you about complete Ransburg services, including the test painting of your products in our laboratories?

Write to Dept. S.

Ransburg ELECTRO-COATING CORP.

Indianapolis 7, Indiana

RANSBURG

water used affects stability and the ability of the mixture to remain in an emulsion.

Prevention—Overheating and excessive aeration can upset the water and solvent balance, speed up changes in the acidity, cause early replacement.

Contamination, mixing oils from more than one supplier, may reduce performance.

Soluble oils should be protected from freezing.

Water—Good water is essential to a good soluble oil cutting solution. Iron, calcium and magnesium salts form insoluble soaps which destroy some emulsifiers. A high solid content may reduce the emulsion stability. Low pH (usually indicates high CO_2) also causes emulsion instability. High bacteria and algae content reduces the emulsion service life, and may contribute to skin rashes. The answer: Treat the water; soften it.

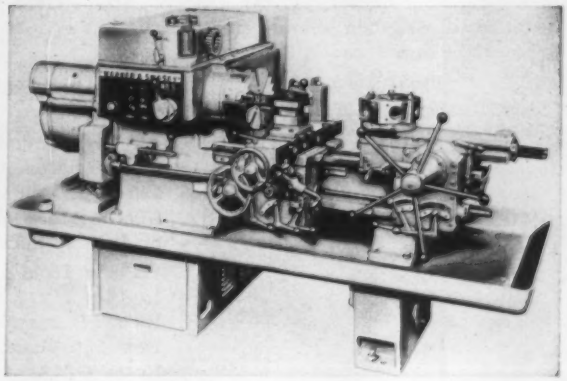
Maintenance — This procedure helps prolong soluble oil:

1. Drain or pump all used emulsion from the system. 2. Disassemble as much of the system as possible. Remove chips, sludge or other contaminants. 3. Precirculate a detergent. 4. Drain the detergent and circulate an antiseptic or disinfectant. Be sure it reaches all remote surfaces. 5. Drain the disinfectant, flush with clean water and recharge with fresh emulsion.

Life—It is impossible to predict service life of a batch of emulsion. It will vary with the system and with machinery.

Dermatitis—This is an inflammation of the skin. Here are some preventive measures: 1. Change from street to work clothes. 2. Wash with warm water and a *mild* soap at lunch and quitting time (some persons are allergic to strong soap). 3. Don't wash the hands in strong oil solvents like carbon tetrachloride or kerosene. 4. Change work clothing at least once a week. 5. Avoid getting soaked with cutting fluid. 6. Use splash guards. 7. Use clean wipers. Check against metal particles—scratches can cause more infection. 8. Don't spit or throw refuse into drains. 9. Skin creams may help.—*Dr. R. K. Gould and R. C. Givens, The Texas Co.*

Turret Lathe Has Spindle Speeds from 25 to 1556 RPM



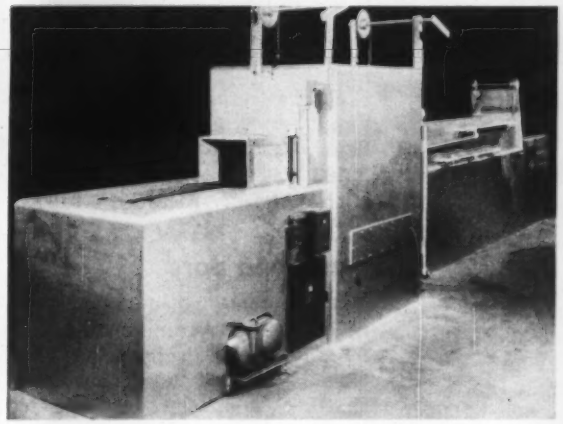
The new No. 5 ram-type turret lathe swings 20 in. over the bed and 10¼-in. over the cross-slide.

The operator's controls are zoned. A lever at the headstock makes all speed changes. Another lever provides forward, reverse, brake or free spindle operation.

A direct-reading speed preselector mounted on the headstock is calibrated in revolutions per minute, surface speeds and work diameters to speed selection of the spindle speed for each cut.

Ways are induction hardened and precision ground. The bed is ribbed diagonally to give extra strength and open area for chip disposal. *Write*: Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O. *Phone*: Henderson 1-5580

Continuous Furnace Gives Top Temperature of 2300° F



The brazing and sintering furnace has a heating chamber 12-in. wide, 8-in. high and 48-in. long.

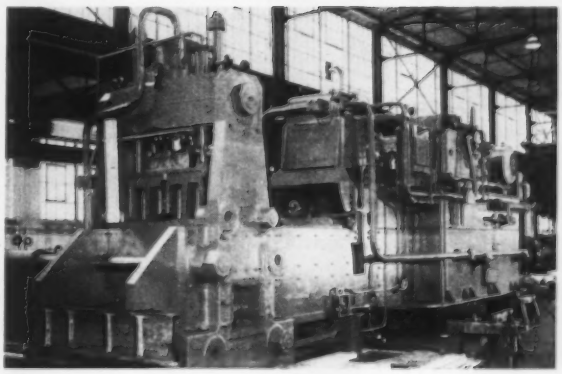
It is heated by eight Globars mounted vertically on two sides. There is a 3-phase to 2-phase variable tap transformer. Maximum input is 35 kw.

The mesh belt is 8-in. wide. A preheating hood is in front of the furnace door. The front door and the one between the furnace and the cooling chamber are made of ceramic tile.

There are gas curtains at the entrance door and the exit end of the cooling chamber, which is 2½-times longer than the heating chamber.

At least 2 in. of water is around the inner section of the cooling chamber. *Write*: Department 9, Waltz Furnace Co., Symmes Ave., Cincinnati, O. *Phone*: Capital 1-2444

Scrap Press Bales Over 50 Tons an Hour



Steel scrap weighing from 1000 to 1200 lb is baled automatically in 30 to 38 seconds.

A hopper dumps the scrap into a 4 x 5 x 10-ft box of a triple compression unit. Bales are 20-in. square and from 20 to 30 in. long.

Two 125-hp opposed-cylinder pumps generate hydraulic pressure to operate the main press rams.

As each bale drops from the bottom of the press, a chute can divert it, or a bale pusher can move it to a conveyor.

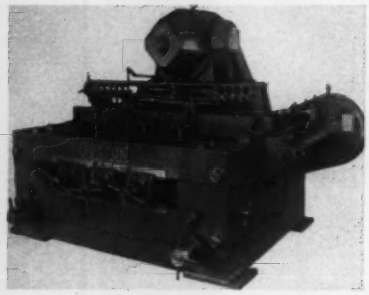
The unit has centralized lubrication.

Loose chips, small slivers and punchings are cleared from the press box with each bale. *Write*: Logemann Bros. Co., Milwaukee 45, Wis. *Phone*: Hilltop 5-0314

NEW PRODUCTS and equipment

Straightening Machine

This machine straightens and polishes cold drawn bars from ¾ to 4½-in. in diameter. It can be installed directly in a fast mill line; production speed is 300 fpm.

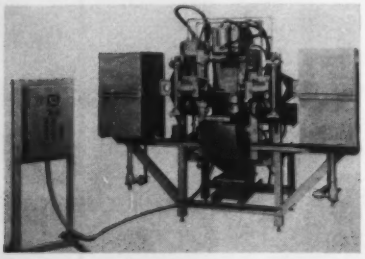


The horizontal pass line has two large rolls opposed by three smaller ones. Four of the five rolls are driven to give the burnishing action needed for a bright, smooth finish.

High or low carbon steel, Bessemer grades and alloys can all be straightened. *Write*: Sutton Engineering Co., First National Bank Bldg., Pittsburgh 22, Pa. *Phone*: Grant 1-8077

Hollow Cores

The Model SC-20-D machine makes shell cores from coreboxes up to 20 x 16 x 10 in.



One operator is needed for the two-station unit. Finished cores are made in 45 seconds.

Hollow cores give faster and easier shakeout, assure closer tolerances, eliminate venting problems and take less curing time.

The machine has twin ovens and twin corebox mounts pivoted to swing in a 180-degree arc between ovens and the fill head in the center of the machine. *Write*: SPO Inc., 6494 Grand Division Ave., Cleveland 25, O. *Phone*: Diamond 1-3666

Small Parts Counter

Model EC will count screws, nuts, screw machine and plastic parts. Its accuracy is guaranteed to be 100 per cent.

A preset number of pieces can be counted automatically at rates from 120 to 1000 a minute. Removal of filled containers can be automated or done by hand.

Parts from 1/16 x ⅛ x ⅛-in. to ¾ x 1 x 2 in. can be handled. *Write*: Pennsylvania Scale Co., P.O. Box 536, Lancaster, Pa. *Phone*: Leola 6-3181

Loading Ramp

A 40-ft magnesium ramp is made of four 10-ft sections fabricated from tread plate and extrusions. Sections weigh from 450 to 525 lb.

When locked together, the sections form a smooth runway from the ground to a freight car door or loading dock. Width varies from 54 in. at the ground to 70 in. at the car end. *Write*: Magline Inc., Pinconning, Mich.

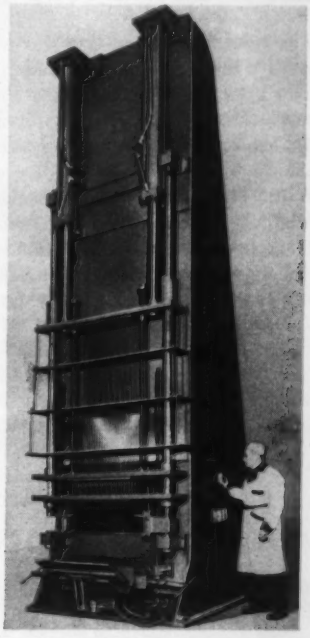
Coil Expander

Copper tubing in finned coil assemblies for evaporators and condensers is expanded and sized by this machine.

An inclined frame makes the machine easy to load. Hydraulic power is used to expand the condenser tubes and size the ends for soldered return bends; expansion mandrels are forced through the tubes.

The tube expander handles air conditioning coil assemblies from 18 to 72 in. Tubing up to ½-in. in diameter with 0.020-in. wall thickness can be expanded.

Tubes in an evaporator coil assembly which is 6 rows wide and 24 rows long are expanded and sized in 15 seconds.



Screws adjust stripper plate, upper travel limit and expansion depth. *Write*: Walter P. Hill Inc., 22183 Telegraph Rd., Detroit 19, Mich. *Phone*: Kenwood 4-9190

Hardened Bars

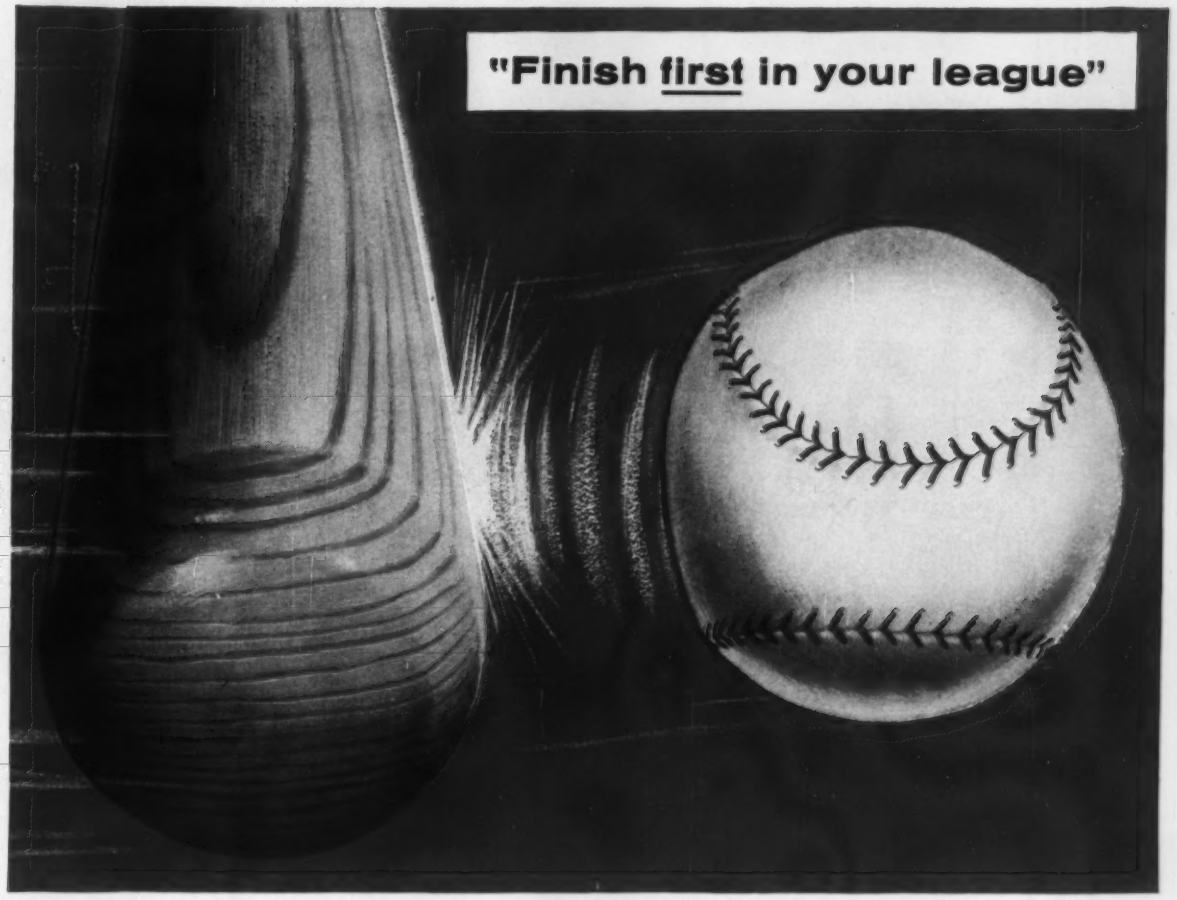
A 1060 steel, called 60 Case, has a Rockwell C hardness of nearly 60. It comes in precision bars which are used for guide rods, shafts, rolls, piston rods, axles, etc.

Diameters range from ¼ to 4 in.; lengths vary from 8 to 14 ft. Minimum hardness depths range from 0.040-in. in smallest diameters to 0.100-in. in the largest. *Write*: Thomson Industries Inc., Manhasset, Long Island, N. Y. *Phone*: Manhasset 7-1800

Strip Mill

The roll change mechanism speeds change-over of rolls and chocks. It changes a complete, 4-high roll in less than 15 minutes by substituting one roll assembly for another.

The roll changer consists of a flat way mounted on the base of the machine on which the roll as-



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These modern, superior J&L Leaded free-machining cold finished steels are meeting with outstanding acceptance in machine shops everywhere. They are a star member of the complete line of premium quality, free-cutting cold finished bar steels produced over the years by J&L specialists. Thus, we can recommend the right type to help solve your machining problems.

Available in *both Bessemer and Open-Hearth grades*, J&L Leaded steels offer:

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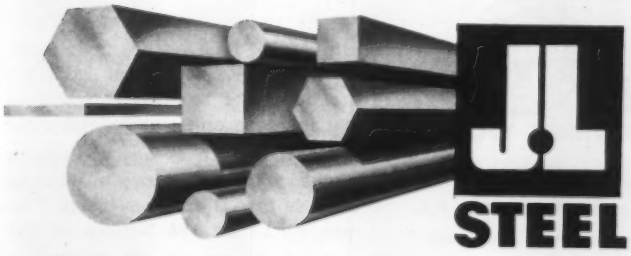
- **GREATER UNIFORMITY**—because they are completely J&L-produced from the basic raw materials to guarantee optimum uniformity so necessary for today's high-speed machining operations.
- **HIGHEST QUALITY**—because they must meet the rigid quality standards developed by J&L through years of leadership in the development and production of free-cutting steels.

Adequate stocks of all J&L cold finished free-machining steels are available in important industrial centers. Phone the nearest J&L District Office or your Distributor for prompt and efficient service.

Pick the Free-Machining Steel that serves you best—from J&L's complete Cold Finished Line



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ING STEEL CORPORATION • YOUNGSTOWN
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TUBE COMPANY • ALLEGHENY LUDLUM STEEL CORPORATION • ARMCO STEEL CORPORATION
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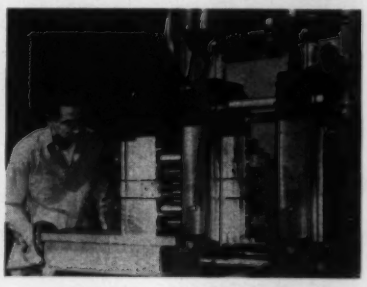
NEW PRODUCTS and equipment

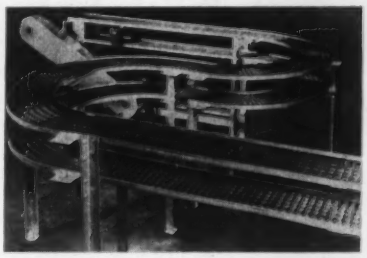
sembly travels. By turning a handwheel, the roll assembly may be moved in or out of the roll housings. Further disassembly is done at a workbench.



Larger pilot plant and production mills have motorized roll change mechanisms. *Write*: Stanat Mfg. Co. Inc., 47-28 37th St., Long Island City 1, N. Y. *Phone*: Ravenswood 9-2420

Flexible Belt

Here's a flat wire belt that can make turns within 2½ times its width. It provides a flow conveyor around corners, poles and other machines. Transfer plates and dead plate transfers are eliminated.



Widths range from 4 in. to 4 ft. Mesh is ½ x 1 in. *Write*: Ashworth Brothers Inc., Winchester, Va. *Phone*: Mohawk 2-3494

Press Brake

This 12-ton unit has a bed and ram 48 in. long. The most practical length of stroke for each job can be preset to speed production and increase operator safety.

Stroke length is adjusted by a stroke control selector; no change is made in bed or die settings. The ram works off the bottom of the

second in a series . . . **CHEMICAL STABILITY**

Comparative stability of MONOFRAX® fused cast refractory (left) vs. fireclay (right) . . . under attack by molten glass, as viewed through the high temperature microscope — one of Carborundum's most useful test facilities. (16 mm. frames shown are not consecutive.)

Unusual Properties of Refractory Materials

Chemical stability — Even under high temperature attack by gases, acids, corrosive solutions, molten salts and molten metals — the chemical stability of CARBORUNDUM'S super refractories enables them to fill industrial requirements that other refractories are unable to meet. For this reason, they are being used with increasing frequency in critical applications: i.e. as linings in controlled-atmosphere furnaces, in the production of muriatic acid, as radiant tubes, in the submerged combustion of liquids containing free acid — such as mixed chlorides and sulphates of iron, zinc, mercury and tin; in retorts for reducing and refining zinc, melting copper alloys and for hundreds of similar applications.

CARBORUNDUM'S laboratories are constantly developing new super refractories to meet specialized application problems. Current research projects include refractory materials for guided missile components, for atomic reactors, and for applications where wear and corrosion are unusually severe.

The forthcoming issue of CARBORUNDUM'S new magazine "Refractories" treats the subject "Chemical Stability of Refractories" in detail. Send for your copy today.

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Refrigerator foot level screw formerly made in two parts. Now cold headed from Keystone "XL" Wire.
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This severely upset part was formerly made by another method—now cold headed at great savings.
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SAVED . . . $20.00 PER M
Another part now cold headed. Result—stronger, free from defects—savings up to $2,000 per year.
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Critical dimensions required for this screw. Now produced by cold heading from Keystone "XL" Wire.

ELCO

COLD HEADING SAVES CUSTOMERS TIME AND MONEY

Elco Tool and Screw Corp., cold heading specialists of Rockford, Illinois, have helped their customers save thousands of dollars. Four case histories are shown above—where cold heading replaced other forming methods at great savings.

The *flowability* characteristics of Keystone "XL" Cold Heading Wire has solved some of the toughest and most extreme heading problems. Because of this feature, Keystone "XL" Wire results in a better finished product, free from defects, greater die life, longer runs and lower costs. Keystone quality now makes it possible to cold head parts that were formerly hot headed or machined.

Keystone does not cold head parts, but your cold heading source can tell you how you can save important dollars in time and materials when the right wire—Keystone "XL" Wire—is applied to your fastener or parts problem!

SEE YOUR KEYSTONE WIRE SPECIALIST

He knows the problems of the cold heading industry. He can help you apply the right wire to the job. For immediate information, send for new booklet—"*Facts About Cold Heading Wire.*" Write to . . .

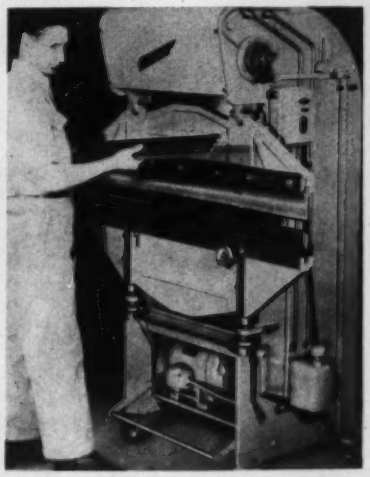
KEYSTONE STEEL & WIRE COMPANY, Peoria 7, Illinois

KEYSTONE WIRE *for Industry*

NEW PRODUCTS and equipment

stroke to develop full pressure.

When the opening is ¼-in., 60 strokes a minute can be made. The rate at the full opening of 1½-in. is 25 strokes a minute.



An adjustable relief valve can be preset to apply only the tonnage needed to bend or punch the material. The back gage is adjustable vertically and horizontally. *Write*: O'Neil-Irwin Mfg. Co., 619 Eighth Ave., Lake City, Minn. *Phone*: 6311

Force Gage

This strain gage makes dynamic measurements of the force changes between the electrodes of a resistance welder on a recording oscillograph.

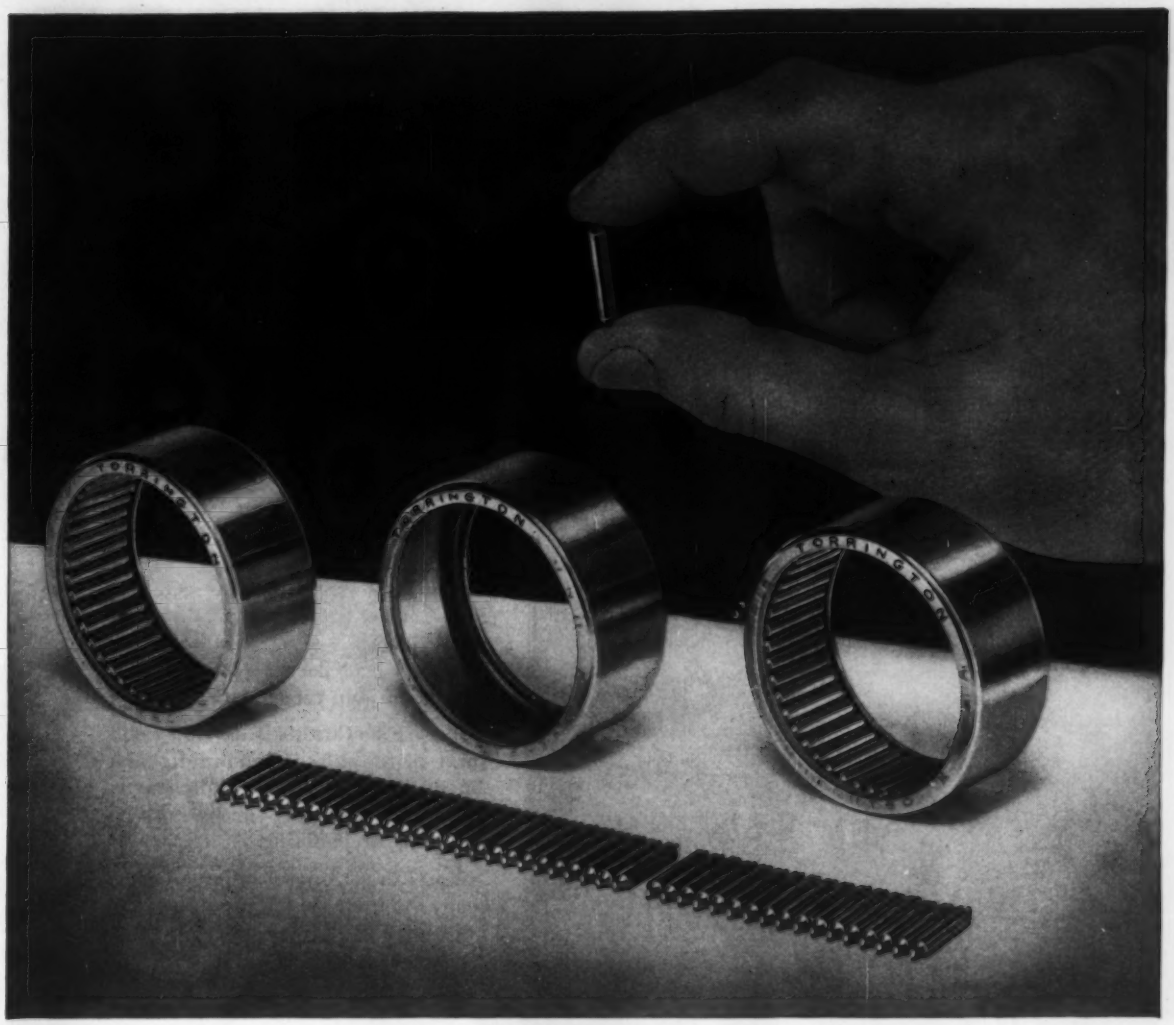
The unit is mounted on a cantilever beam of nonmagnetic materials. It can be adjusted to machines with throat depths from 12 to 60 in.

The unit can be mounted on spot or seam welders. *Write*: Department M-7, Sciaky Bros. Inc., 4915 W. 67th St., Chicago, Ill. *Phone*: Portsmouth 7-5600

Hydraulic Slotter

Model SM is for accurate, rapid machining of all metals. It comes in 36 and 48-in. stroke lengths.

The machine has a full hydraulic drive with two speed ranges. A servo controls the pump, so that cutting speed may be infinitely varied from zero to the maximum



Here's where the **TORRINGTON NEEDLE BEARING** *gets its precision*

This Needle Roller is the "work horse" of the Torrington Needle Bearing. Its jewel-like precision is the key to smooth performance of the Needle Bearing. That's why in every manufacturing step—from alloy selection to final polishing—the rollers are checked against strict quality controls.

A full complement of Needle Rollers, mounted in a precision-made, case-hardened retaining shell, provides a maximum number of contact lines, giving the Torrington Needle Bearing a higher radial load capacity than any other bearing of comparable size.

The Torrington Needle Bearing delivers top anti-friction performance—with low coefficient of both starting and running friction.

For more than twenty years, our Engineering Department has helped designers and manufacturers throughout industry to adapt the unique advantages of the Needle Bearing to their products. Let us help you make the Needle Bearing "standard equipment" in yours.

See our new Needle Bearing Catalog in the 1956 Sweet's Product Design File —or write direct for a catalog.

TORRINGTON NEEDLE BEARINGS
Give you these benefits

- low coefficient of starting and running friction
- full complement of rollers
- unequalled radial load capacity
- low unit cost
- long service life
- compactness and light weight
- runs directly on hardened shafts
- permits use of larger and stiffer shafts

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Free-Cutting CHASE® BRASS ROD
makes tools last longer, lowers production costs!
The big difference in machining Chase Free-Cutting Brass Rod is a direct result of just the *right* amount of evenly dispersed lead particles in the alloy. The proof is in the chips!
Chase Free-Cutting Brass Rod yields short, brittle chips which rapidly clear cutting tools — make possible heavier feeds, higher cutting speeds—without gumming or jamming.
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Charlotte†	Dallas	Houston	Milwaukee	New York	Rochester†
	St. Louis	San Francisco	Seattle	Waterbury	

in either range. Feeds are controlled in the same manner.

Both feeds and speeds are controlled from a pendant which can be swung through 240 degrees.

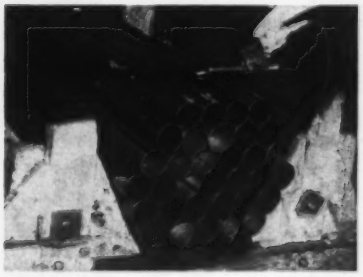
Longitudinal, traverse and rotary movements are operated and selected from the pushbutton station of the machine.

A built-in dividing head is arranged for power operation.

A 40-hp, variable delivery, radial piston pump supplies hydraulic power. *Write*: Department K, Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill. *Phone*: 3-7611

Pneumatic Stretcher

Here's a stretcher for round or irregular packages where the strapping surface is limited.



Less effort is needed; the degree of tension is controlled by air pressure. The tool is for production line use with 5/8 and 3/4-in. strapping. It weighs less than 7 lb. *Write*: Brainard Steel Division, Sharon Steel Corp., Warren, O. *Phone*: 2154-1

LOWER YOUR COSTS IN PLATING

THE FINISHING TOUCH

by Guy A. Cummings
Metal Finishing Sales Manager
FREDERIC B. STEVENS, INC.

How Modern Equipment Can Improve Your Operations

Judging from the vast number of quotations on automatic equipment for electroplating, anodizing and processing being made each month at Stevens, we know the interest in automatic equipment has never been higher. To meet competitive prices, improve finishes and lower labor costs, metal finishers are constantly challenged to make modern improvements in their operations. Usually this means more modern equipment.

Let us tell you how the Stevens Automatic Barrel Plating Machines can help you. They are used for zinc, cadmium, nickel, brass plating of such small parts as screws, bolts, nuts and stampings, and also a wide variety of bulk immersion processes such as phosphatizing, washing, pickling, and chromating.

We have been making these machines for a long long time—hundreds are in operation—so you can be confident that there are no mechanical bugs. They are simple to operate—feature automatic unloading—and when equipped with automatic load devices, several machines can be operated by only one man. The cylinders which take the parts to be plated are the oblique open ended type—without

covers. By raising or lowering the cylinder the parts slide in and out without the necessity of unclamping and removing covers normally needed for horizontal type cylinders.

The Stevens simple compact design makes it economically feasible to purchase production capacities as high as 4000 pounds per hour in one machine, or just as practical to distribute the capacity between two or more machines to provide flexibility in plating thickness, production, etc.

Here are other advantages in using Stevens Automatic Barrel Machines—uniformity of deposit, fewer rejects, better working conditions, easier chemical control, better scheduling and delivery and *lower costs per piece.*

The selection of the right equipment, the capital investment required, the arrangement of your plant to install the equipment are important considerations. Frederic B. Stevens, Inc., with its long experience in the metal finishing field has made many analyses of this kind. We can help you too.

Write to Frederic B. Stevens, Inc., 1808 18th Street, Detroit 16, Michigan.

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METAL FINISHING EQUIPMENT AND SUPPLIES FROM CASTINGS OR STAMPINGS TO FINISHED PRODUCT

BRANCHES:
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INVESTMENT CASTING IS ECONOMICAL IF...

- **Performance requirements demand use of alloys that are difficult to form or machine.**
- **Intricate shape or unusual contours cause expensive machining, finishing, and/or assembly costs.**
- **Production runs too small to warrant machine set-ups.**
- **Part sizes are smaller than 10" or lighter than 10 pounds.**
- **Realistic tolerances and inspection standards are specified.**

ARWOOD engineers will gladly help you with your design and production problems. They are casting specialists. Let them study your blueprints or a sample part and save you time, effort and money.

A CASE IN POINT!
LIGHTER, STRONGER, CHEAPER

Stainless steel hinge for military ordnance component was formerly composed of a stamped bracket and machined hinge, welded together and assembled to a complicated anti-rotation device. Entire unit is now cast in one piece and is lighter and stronger. Hole-reaming is only machining required.

Write TODAY for your FREE copy of "A Critical Survey of Investment Castings", written especially for design and production engineers.

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"PIONEERS IN INVESTMENT CASTING"

NEW literature

Write directly to the company for a copy

Precision Casting

Bulletin GC-2, 20 pages, describes the Glascast process of making shock-resistant molds for high melting point alloys. Refractory Products Sales Department, Corning Glass Works, Corning, N. Y.

Tool Steel Chart

It lists more than 300 brands of tool steels offered by 12 producers. Vulcan Crucible Steel Co. Division, H. K. Porter Company Inc., Aliquippa, Pa.

Process Piping

Here's information on the welding characteristics of austenitic and ferritic stainless tubing and pipe—bulletin TDC-162A, 4 pages. Tubular Products Division, Babcock & Wilcox Co., Beaver Falls, Pa.

Blast Cleaning

A steel grit for producing etched finishes on metal is described in bulletin 901-D, 4 pages. Wheelabrator Corp., 1157 S. Byrkit St., Mishawaka, Ind.

Cooling Systems

Sections used to build cooling and condensing systems for process fluids are depicted in bulletin HT-23, 24 pages. Heat Transfer Division, National-U.S. Radiator Corp., 342 Madison Ave., New York 17, N. Y.

Tank and Vessels

Catalog 554, 48 pages, describes the corrosive action of 200 chemicals on 16 metals. Nooter Corp., 1400 S. Second St., St. Louis, Mo.

Portable Power Tools

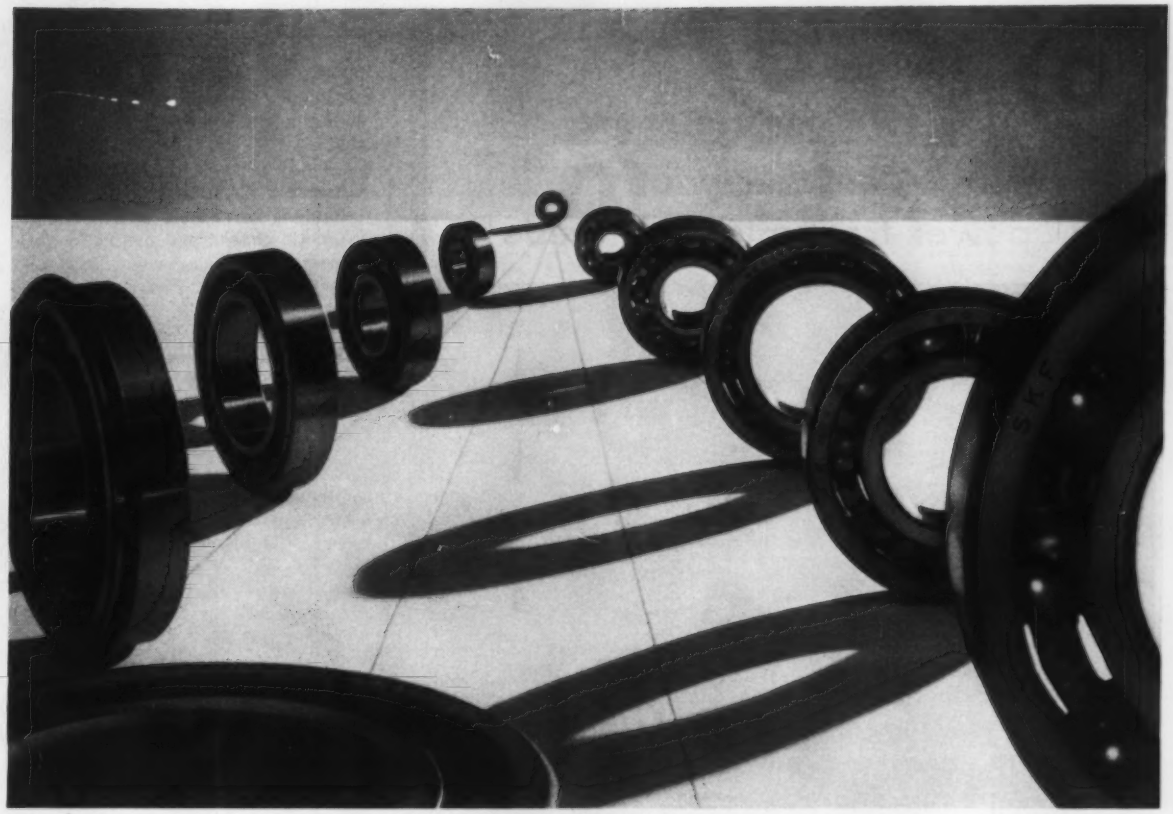
A 58-page catalog describes portable and radial saws; drills, drivers and nut runners; belt, oscillating and disc sanders; portable, bench and valve seat grinders; refacers and polishers. Skil Corp., 5033 Elston Ave., Chicago 30, Ill.

Filter

A continuously cleanable 40-micron filter for diesel and machine tool lube, fuel and hydraulic lines is described in bulletin SAK-057, 8 pages. Cuno Engineering Corp., Meriden, Conn.

Production Lathe

A single point lathe with an automatic cycle for roughing and finishing with separate tools is described in bulletin 14-1, 6 pages. Bulletin



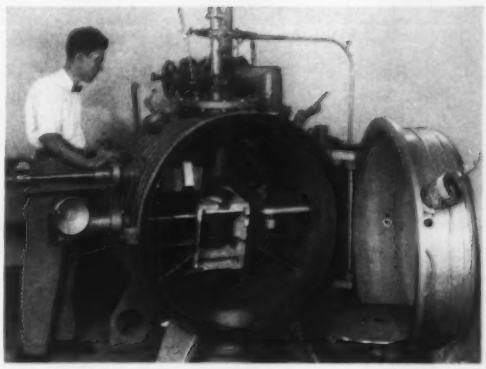
Will Vacuum Melted Metals do for YOUR Product what they do for Ball Bearings?

A Vacuum Furnace will help you get the Answer

Vacuum melted steels are consistently free of inclusions and exceptionally clean. As a result they provide for ball bearings:

1. Bearing life consistently 100% to 200% better than handbook ratings for normal temperature operations.
2. Bearing life consistently up to 600% longer for high temperature, high speed applications.
3. Up to 90% reduction in bearing race rejects.

Would metals with such characteristics make your product better? A vacuum furnace will enable you to develop materials especially suited to your needs. We have made and operated more high vacuum furnaces than any other manufacturer in the world. Can we help you, too? Send coupon below today.



NRC Model 2555 Vacuum Furnaces are now being used by aircraft companies, engine manufacturers, investment casters, specialty steel producers to speed up development of new materials that will meet ever more severe operating requirements.

Other NRC high vacuum products include: analyzers, dehydrators, freeze driers, impregnators, gauges, metallizers, pumps, valves.

NRC

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Please send me Model 2555 Data Sheet ☐ NRC Vacuum Furnace Bulletin ☐
Have your representative call ☐

Name..... Title.....

Company.....

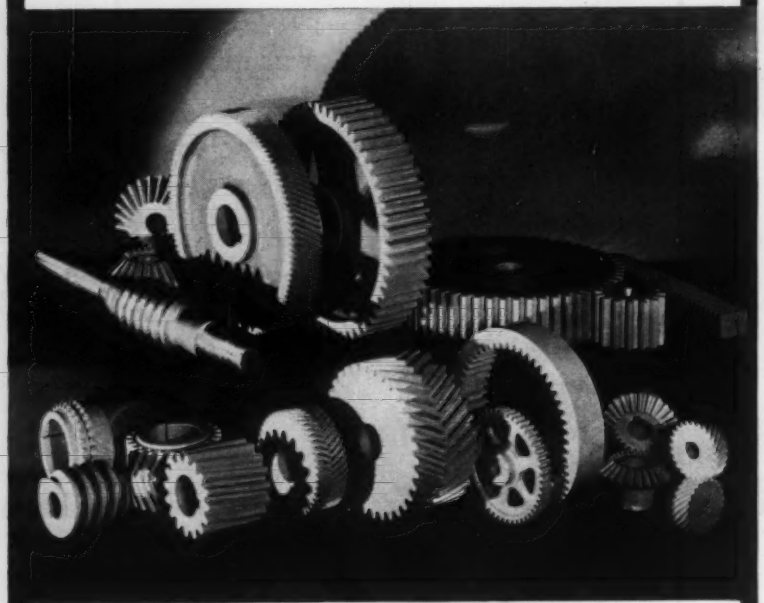
Address.....

City..... Zone.... State.....

One of these 9

H&S Gears

is sure to answer your power transmission needs!



Spur • Racks • Bevel • Mitre • Internal • Worm • Helical • Spiral • Herringbone

Regardless of type, every H & S Gear is of the rugged, "husky" type. Heavy rims are well reinforced. Hubs are heavy in section, eliminating the need for key patches. All sharp corners are broken and generous fillets are provided.

H & S Gears are available of Steel, Hardened Steel, Alloys, Cast Iron, Bronze, Rawhide, Fibroil, or Bakelite.

Exacting care is exercised in every manufacturing step of H & S Gears. This insures *quietness of operation, uniform velocity ratio,* and *freedom from vibration.*

Whether you need a gear that weighs one ounce or 10 tons, why not put our years of gear engineering experience to work for you. Just send us the specifications or call. There's no obligation.

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GEARS AND SPEED REDUCERS

5112 Hamilton Avenue

Cleveland 14, Ohio

Send note on Company Letterhead for complete H & S Catalog

NEW LITERATURE

14P-1, 6 pages, describes a punch card control system to run the lathe. Sundstrand Machine Tool Co., Rockford, Ill.

Magnetic Chucks

Rectangular, rotary and sine angle magnetic chucks and magnetic work drivers solve holding problems—bulletin 412, 22 pages. Taft-Peirce Mfg. Co., Woonsocket, R. I.

Alloy and Stainless Steels

Catalog 175-A, 102 pages, lists corrosion resistant data, chemical composition and mechanical properties of alloy steels and describes facilities for making static, shell and centrifugal castings. Electric Steel Foundry Co., 2141 N. W. 25th Ave., Portland 10, Oreg.

Snagging Wheels

Advantages of various types of grinding wheels for steel mills, foundries and forge shops are presented in bulletin GS-55, 4 pages. Electro Refractories & Abrasives Corp., 344 Delaware Ave., Buffalo 2, N. Y.

Tool Catalog

Drills, reamers, counterbores, countersinks and special tools are listed in catalog 55, 52 pages. Chicago-Latrobe Twist Drill Works, 411 W. Ontario St., Chicago 10, Ill.

Sheet Metal Tools

Compound leverage shears, straight snips, bench shears and other hand tools for sheet metal work are described in bulletin 78, 10 pages. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.

Mold Coatings

Colloidal dispersions for permanent mold casting, diecasting and sand casting are covered in bulletin 425, 4 pages. Acheson Colloids Co., division of Acheson Industries Inc., Port Huron, Mich.

Gearmotors

A line of gearmotors using new NEMA motors and redesigned gearheads is presented in 8-page bulletin E-2408. Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, O.

Aluminum Diesel Pistons

A 4-page folder explains how groove inserts made of Ni-Resist austenitic iron increase the life of pistons. Reader Service Section, International Nickel Co. Inc., 67 Wall St., New York 5, N. Y.

FAMOUS FIRSTS IN THE IRON & STEEL INDUSTRY

REVOLUTION AT THE OPEN HEARTH

Photo courtesy of The Wellman Engineering Company

Prior to 1895, open hearth furnaces were charged by hand with long, slab-like peels supported by a jib crane. Straining furnace crews pushed the heavily loaded peels through the charging doors and dumped the contents onto the hearths. Costs were high. Working conditions were poor and the labor, backbreaking.

In 1887, S. T. Wellman first developed a machine for mechanically charging the open hearth. Movements of the peel were controlled by a hydraulic cylinder and steam-operated winch. Modifications were later made and electrical controls added. In 1895, the first machine was put into successful operation at the Homestead Works of the Carnegie Steel Company.

The reduced costs and increased output made possible by this machine resulted in its being credited with perhaps the greatest single contribution toward the progress of the open hearth process.

In a less dramatic way, Baker's MAGDOLITE also has made and is making important contributions to the iron and steel industry. MAGDOLITE is a name to remember because its use actually provides more uniform ingots *plus* increased furnace efficiency at *lower refractory costs.*

With MAGDOLITE you have a dependable product which is consistently 5-ways better... in composition, preparation, strength, economy, and quality.

The next time you buy, be sure to specify Baker's MAGDOLITE.

ANOTHER FAMOUS FIRST

JEBCO
PRODUCTS
SINCE 1889

BAKER'S MAGDOLITE

The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO

Pride in product is perhaps the strongest reason for Follansbee's reputation in the industry as, "A Quality Producer of Cold Rolled Strip." And Follansbee mill operators are not satisfied until every specification on every order is met *exactly*.

Why not add your name to our growing list of satisfied users. A Follansbee representative is always near at hand and anxious to prove what true quality and unmatched service can do for you and your product.

FOLLANSBEE

STEEL CORPORATION

FOLLANSBEE, WEST VIRGINIA

Cold Rolled Strip • Seamless Terne Roll Roofing • Polished Blue Sheets and Coils

Sales Offices in Principal Cities

STEEL
March 26, 1956

Market Outlook

IRON AND STEEL production is hitting some roadblocks—work stoppages and furnace repairs.

They caused a 1-point reduction in output of steel for ingots and castings in the week ended Mar. 25. This lowered the week's national production rate to 98.5 per cent of capacity.

ON STRIKE—Work stoppages hit steel production at the Youngstown operations of Youngstown Sheet & Tube Co. and the Atlanta facilities of Atlantic Steel Co. Woodward Iron Co., Woodward, Ala., and U. S. Pipe & Foundry Co., Birmingham, also are tied up by strikes.

TIME OUT—Week-after-week production of steel at capacity rates is taking its toll of furnace life. Enough furnaces are off for repairs to trim back the operating rates in several districts. But some districts still are operating above the 100-per-cent-of-capacity level.

A CONTRAST—New England is an exception to high rates of production. Its pace has been slackening since the first of the year, and in the week ended Mar. 25 was at 82 per cent of capacity, compared with the national rate of 98.5. A buyers' market has returned again to that area. Sheet and other flat-rolled tonnage offered—except cold-rolled silicon strip—exceeds demand. Earlier allotments are being supplemented by substantial tonnage by an increasing number of producers. Some producers are equalizing on freight to around $4 a ton. This heavier volume is not being taken up by manufacturing accounts or distributors. An increasing number of consumers in New England report their inventories are up to satisfactory levels. Ordering is slowing in that region, and some non-automotive stampers are asking that shipments be deferred to July and August.

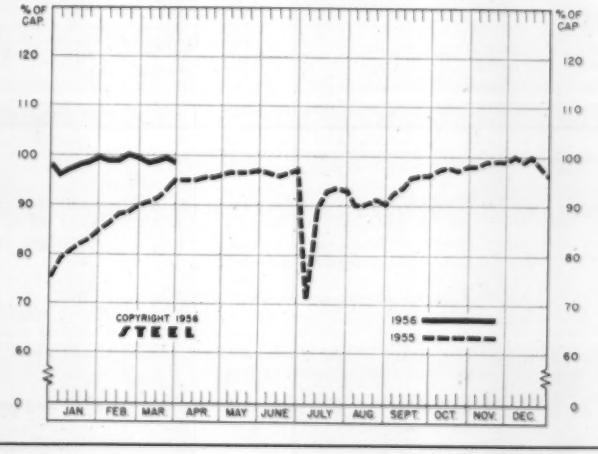
The New England situation is not typical of that of the rest of the nation. Even as close by as Philadelphia, demand for hot and cold-rolled sheets is rising.

FAIR WEATHER—Many barometers indicate a strong demand will continue this year for steel: Business firms plan to spend a record $35 billion this year for new plant and equipment. Admiral Corp.'s president, Ross D. Siragusa, expects the nation's sales of refrigerators this year to go 10 per cent above last year's, freezer sales to rise 20 per cent and electric range sales to move up 10 per cent. The Erie Railroad contemplates expenditures that will be one-third greater this year than the average of the last ten years.

SHORT OF STEEL—Demand for some of the forms of steel used by the construction and railroad industries is so far in excess of supply that work on projects is being hampered. A shortage of steel plates and structural shapes forced the Pennsylvania Railroad to cut back its freight car building program at its Altoona, Pa., shops and to lay off many employees there.

PRICES—Steel prices remain largely unchanged. Producers continued to adjust prices of cold-rolled flat wire upward $10 a ton and merchant quality wire upward $2 a ton. Washington Steel Corp., Washington, Pa., lowered type 430 stainless steel sheets $45 a ton to help promote sales of the nonnickel-bearing grade. These changes do not affect STEEL's price composite on finished steel. It holds at $128.02 a ton.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Mar. 25	Change	Same Week 1955	Same Week 1954
Pittsburgh	102.0	— 1*	97	74
Chicago	100.0	— 1*	97	76.5
Mid-Atlantic	99.0	— 1	92	61
Youngstown	90.0	— 8	96	66
Wheeling	96.0	— 1	93.5	70
Cleveland	98.0	— 1.5*	96	60
Buffalo	105.0	0	99	70
Birmingham	96.0	+ 8	87.5	78
New England	82.0	+ 2	76	57
Cincinnati	93.0	— 6.5*	87	67
St. Louis	100.0	— 1*	95	52
Detroit	100.0	0	90	89
Western	103.0	+ 1	96	76
National Rate	98.5	— 1	95	68

INGOT PRODUCTION‡

	Week Ended Mar. 25	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	152.3	154.2	151.5	140.8
NET TONS (In thousands)	2,446	2,477	2,433	2,262

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954.

Metalworking Outlook—p. 79 Technical Outlook—p. 125

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Mar. 20 1956	Mar. 13 1956	Month Ago	Feb. Average
(1947-1949=100)	157.1	157.1	157.1	157.1

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 20

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.800	Sheets, Electrical	$10.175
Rails, Light, 40 lb	6.217	Strip, C.R., Carbon	8.243
Tie Plates	5.625	Strip, C.R., Stainless, 403 (lb)	0.444
Axles, Railway	8.350	Strip, H.R., Carbon	5.606
Wheels, Freight Car, 33 in. (per wheel)	52.50	Pipe, Black, Buttweld (100 ft)	16.997
Plates, Carbon	5.200	Pipe, Galv., Buttweld (100 ft)	21.137
Structural Shapes	4.867	Pipe, Line (100 ft)	167.250
Bars, Tool Steel, Carbon (lb)	0.460	Casing, Oil Well, Carbon (100 ft)	165.120
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560	Casing, Oil Well, Alloy (100 ft)	244.670
Bars, Tool Steel, H. R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185	Tubes, Boiler (100 ft)	39.470
Bars, Tool Steel, H.R., Alloy, High Speed W-18, Cr 4, V 1 (lb)	1.680	Tubing, Mechanical, Carbon	20.980
Bars, H.R., Alloy	9.425	Tubing, Mechanical Stainless, 304 (100 ft)	178.897
Bars, H.R., Stainless, 303 (lb)	0.450	Tin Plate, Hot-dipped, 1.25 lb	8.933
Bars, H.R., Carbon	5.500	Tin Plate, Electrolytic, 0.25 lb	7.633
Bars, Reinforcing	5.313	Black Plate, Canmaking Quality	6.733
Bars, C.F., Carbon	8.800	Wire, Drawn, Carbon	8.575
Bars, C.F., Alloy	12.275	Wire, Drawn, Stainless 430 (lb)	0.590
Bars, C.F., Stainless, 302 (lb)	0.475	Bale ties (bundle)	6.473
Sheets, H.R., Carbon	5.345	Nails, Wire, 8d Common	8.603
Sheets, C.R., Carbon	6.214	Wire, Barbed (80-rod spool)	7.847
Sheets, Galvanized	7.770	Woven Wire Fence (20-rod roll)	18.635
Sheets, C.R., Stainless 302 (lb)	0.588		

STEEL's FINISHED STEEL PRICE INDEX*

	Mar. 21 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	209.10	209.10	209.10	194.53	171.92
Index in cents per lb	5.665	5.665	5.665	5.270	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$128.02	$128.02	$128.02	$118.23	$106.32
No. 2 Fdry Pig Iron, GT	58.99	58.99	58.99	56.54	52.54
Basic Pig Iron, GT	58.49	58.49	58.49	56.04	52.16
Malleable Pig Iron, GT	59.77	59.77	59.77	57.27	53.27
Steelmaking Scrap, GT	49.83	49.17	48.38	37.75	44.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Mar. 21 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30	3.70
Bars, H.R., Chicago	4.65	4.65	4.65	4.30	3.70
Bars, H.R., deld. Philadelphia	4.93	4.95	4.90	4.55	4.18
Bars, C.F., Pittsburgh	6.25*	6.25*	6.25*	5.40	4.55
Shapes, Std., Pittsburgh	4.60	4.60	4.60	4.25	3.65
Shapes, Std., Chicago	4.60	4.60	4.60	4.25	3.65
Shapes, deld., Philadelphia	5.00	5.00	4.88	4.53	3.90
Plates, Pittsburgh	4.50	4.50	4.50	4.225	3.70
Plates, Chicago	4.50	4.50	4.50	4.225	3.70
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.225	4.15
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225	3.70
Plates, Claymont, Del.	4.80	4.80	4.80	4.225	4.15
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.60-3.75
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05	3.60
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Detroit	5.325-5.425	5.325-5.425	5.325-5.425	5.10	4.55
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.45	4.80
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.75-4.00
Strip, H.R., Chicago	4.325	4.325	4.325	4.05	3.50
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75	4.65-5.35
Strip, C.R., Chicago	6.25-6.35	6.25-6.35	6.25-6.35	5.85	4.90
Strip, C.R., Detroit	6.35	6.35	6.35	5.90	4.35-5.60
Wire, Basic, Pittsburgh	6.60	6.60	6.60	5.75	4.85-5.10
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.45	$9.45	$9.45	$9.05	$8.70

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.90	$66.00
Wire rods, ⅜-⅝" Pitts.	5.375	5.375	5.375	4.675	4.10-4.30

PIG IRON, Gross Ton					
Bessemer, Pitts.	$59.50	$59.50	$59.50	$57.00	$53.00
Basic, Valley	58.50	58.50	58.50	56.00	52.00
Basic, deld. Phila.	62.16	62.16	62.16	59.66	56.39
No. 2 Fdry, Pitts.	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Chicago	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Valley	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, deld. Phila.	62.66	62.66	62.66	55.16	56.89
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88	48.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	55.58
Malleable, Valley	59.00	59.00	59.00	56.50	52.50
Malleable, Chicago	59.00	59.00	59.00	56.50	52.50
Ferromanganese, Duquesne	205.00†	205.00†	205.00†	190.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$49.00	$48.50	$47.50	$38.50	$45.00
No. 1 Heavy Melt, E. Pa.	51.00	50.00	50.50	38.75	43.50
No. 1 Heavy Melt, Chicago	49.50	49.00	47.00	36.00	43.50
No. 1 Heavy Melt, Valley	55.50	52.50	52.50	37.50	45.00
No. 1 Heavy Melt, Cleve.	52.50	50.50	49.50	35.00	44.00
No. 1 Heavy Melt, Buffalo	47.50	47.50	46.50	32.50	44.00
Rails, Rerolling, Chicago	66.50	65.50	66.50	50.50	52.50
No. 1 Cast, Chicago	48.50	48.50	46.50	40.00	49.00

COKE, Net Ton					
Beehive, Furn, Connlsvl.	$14.125	$14.125	$14.125	$13.75	$14.75
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75	17.50
Oven, Fdry, Chicago	27.00	27.00	27.00	24.50	21.00

Daily Nonferrous Price Record

	Price Mar. 21	Last Change	Previous Price	Feb. Avg.	Jan. Avg.	Mar. 1955 Avg.
Copper	46.00-54.50	Mar. 15, 1956	46.00-54.00	48.076	46.700	33.222
Lead	15.80	Jan. 13, 1956	16.30	15.800	15.960	14.800
Zinc	13.50	Jan. 6, 1956	13.00	13.500	13.440	11.500
Tin	100.625	Mar. 21, 1956	100.875	100.908	105.067	91.176
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	64.500
Aluminum	24.40	Aug. 8, 1955	23.20-24.40	24.400	24.400	23.200
Magnesium	32.50	Aug. 16, 1955	28.50	32.500	32.500	27.556

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.** Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.** Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.** Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.** Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

No. 17 Billet Shear. Capacity, 10" rounds or 9" squares, 6 strokes per minute.

a "Buffalo" billet shear did it all in 10 minutes!

You're looking at a hundred 7" square billets readied for forging in just ten minutes by a "Buffalo" No. 15 Billet Shear with automatic feed table and back gage. This is just a sample of the high output of "Buffalo" Billet Shears in the nation's leading shops.

"Buffalo" Billet Shears are built in 11 sizes to handle *your* size rounds, squares or flats. The smallest one shears thirty 2¼" rounds per minute; the largest, six 10" rounds per minute. Rigid arc-welded steel plate frames —"power" lubrication—air operated clutches, counterbalance and hold-down—are some of the "Q" Factors* that assure you years of service with practically no maintenance.

And note the clean, square faces of each cut. There's no smearing to conceal porosity, as with burning or sawing. The shear penetrates only $\frac{3}{16}$", localizing a neat, accurate vertical fracture. Divisions are uniform in dimensions and weight. Your quality keeps up with your speed!

Write for Bulletin 3295-C for all details.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

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BUFFALO FORGE COMPANY

Machine Tool Division

158 MORTIMER STREET BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING BENDING

Nonferrous Metals

Copper heads toward world price based on London Metal Exchange quotations. Aluminum spokesmen forecast new markets and demand for the lightweight metal

Nonferrous Metal Prices, Pages 182 & 183

ANACONDA CO. has taken the first step (Mar. 19) toward establishing a uniform world price for copper.

Its Chilean copper is priced in accord with the day-to-day fluctuations of the London Metal Exchange (about 54.5 cents a pound). Anaconda says that its domestic production will continue to be sold at the 46-cent-a-pound level. Kennecott Copper Corp., the other major producer in Chile, will have little choice but to follow.

What's Happening? — Anaconda hopes to: 1. Relieve pressures which have been placed on U. S. producers in South America since the LME prices rose above parity with the domestic quotation. 2. Bring more copper into the U. S. pipeline. (This will not happen until 1957 because almost all the Chilean production is sold for the rest of '56.)

One industry observer told STEEL: "Before the year ends, look for primary producers to announce that they will base all copper prices on the LME market price. World copper prices could then level off to about 50 cents a pound."

Custom-smelted copper may go higher than its current 54.5 cents a pound if scrap prices take another hike. Chances are they will—at least temporarily.

Aluminum Makers Look Ahead

The average aluminum content of American cars went from 30 lb in 1955 to 35 lb this year, says Aluminium Ltd., and by 1960 will average 75 lb. At a rate of 8 million cars annually, this will take some 300,000 tons of the lightweight metal.

Filing its report to the Royal Commission on Canada's Economic Prospects (it's like the Paley Report), Aluminium people made more predictions: Production capacity will jump from 650,000 tons at the end of 1955 to 762,000 tons in 1956; to 792,000 tons, 1957; to 852,000 tons, 1958; and to 912,000 tons, 1959. By 1960, the electrical industry will need 820,000 tons of aluminum. The use of the white metal for portable sprinkler irrigation pipe could reach 100,000 tons a year by 1960. And, says the report, free world capacity in 1960 will be 4,462,500 tons (Canada, 1,032,000 tons; U. S., 2,318,500 tons; others, 1,112,000 tons).

If you are interested in the long-term prospects for aluminum, the report estimates that in 1980 the average car will have 200 lb of aluminum; aluminum cans may represent from 5 to 10 per cent of the canning industry's output.

Aluminum Co. of America's annual report sums up industry confidence when it states: "In spite of continued but decreasing military requirements, expanding civilian demand has been solely responsible for Alcoa's increase in business. New markets are developing rapidly and established uses are undergoing tremendous growth."

ODM Looks at Nickel Again

Many old recommendations from industry regarding new nickel capacity are being dusted off by the Office of Defense Mobilization. ODM's rekindled interest stems from military demand for greater quantities of nickel for guided missiles, aircraft and propulsion plants. Under present circumstances, the administration is faced with the old question: "Should we or shouldn't we put controls on nickel." There is a feeling that even the politicos think that controls would only muddle things more.

There will be some important questions to iron out before any company agrees to enter the nickel business. Military and civilian demands could be met if the government were not stockpiling. There are indications that the stockpile quota may be reached by 1958. This means that only National Lead Co. (presently operating the U. S. Nicaro project) could be a producer of nickel ingot before the stockpile quota is reached. If industrialists are going to be asked to enter the field, the government will have to guarantee a solid market. History shows that the U. S. usually has little interest in purchasing additional tonnage after stockpile goals have been reached.

Lead Sales Firm

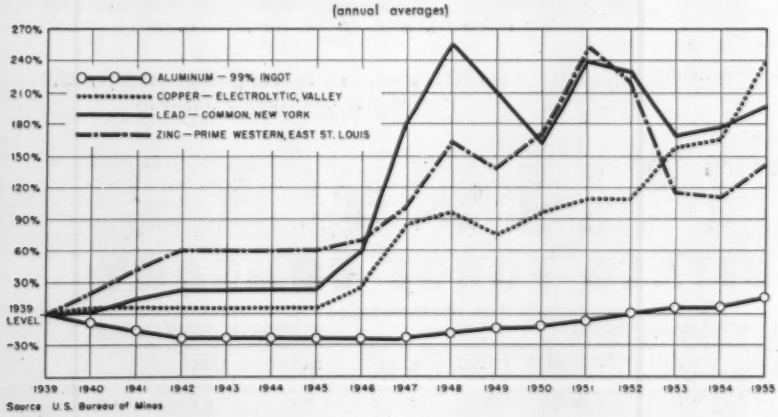
All signs are pointing to a peak year for the lead industry. Stocks in producers' hands at the end of 1954 totaled 93,000 tons. At the end of last year they diminished to 30,000 tons. This year, lead demand has dipped slightly, but most producers point out that they are keeping pace with or are slightly ahead of 1955 sales for the corresponding period. The market remains firm, and the General Services Administration continues to ask for stockpile lead. It is estimated that GSA will be in the market for some 50,000 tons of lead in '56. This will provide a firm floor throughout the year as producers' stocks still are too low to offer the government more than token tonnages. Upcoming labor negotiations could make the supply situation tighter, too (over a month of production was lost last year).

Good News for Tin

The strike of Malayan tin workers is off again. It now appears that the strike has been postponed indefinitely. With the good news, domestic prices dropped to about $1.00 a pound.

Price Changes of Nonferrous Metals Since 1939

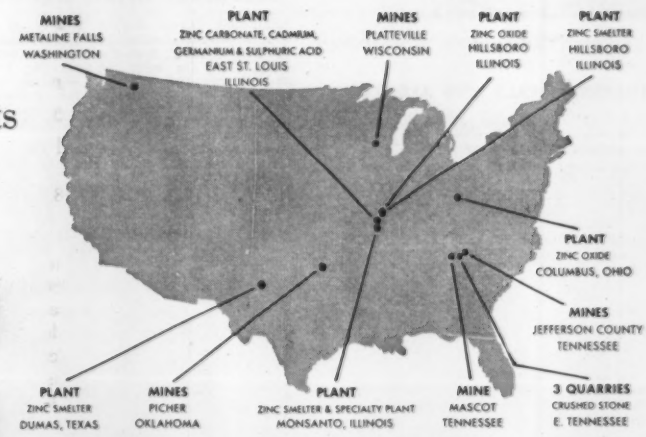
(annual averages)

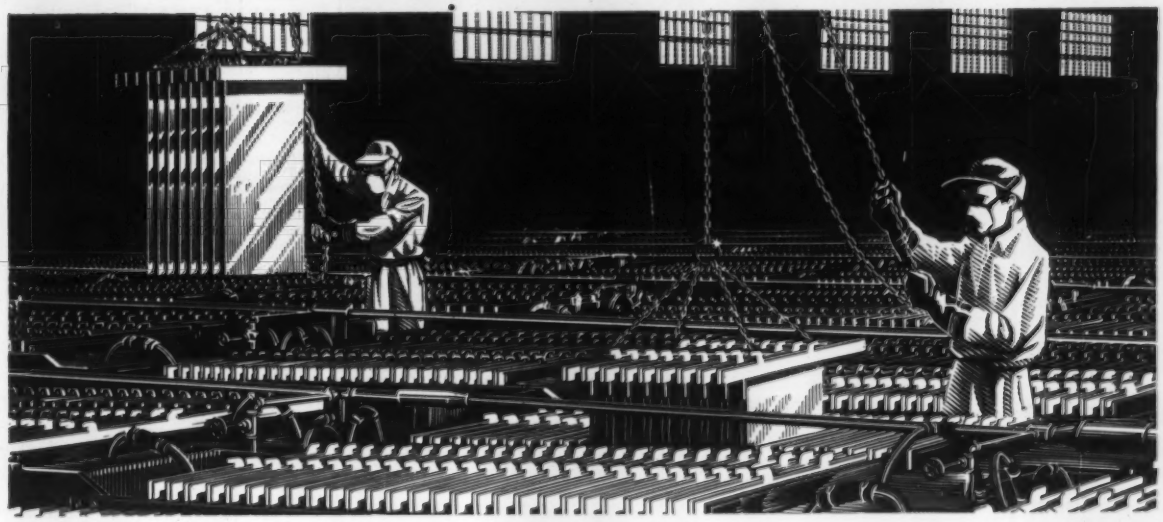


Source U.S. Bureau of Mines

American Zinc and its products

from A *to* Z





OPERATIONS AT MONSANTO, ILLINOIS

Modern and recently expanded electrolytic plant producing special high grade slab zinc, which is sold primarily to the die casting and brass manufacturing industries. In conjunction is a specialty plant for the production of zinc ball anodes, heavy plating anodes and anodes for cathodic protection. For complete picture of American Zinc operations, see map above.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
AGRICULTURAL LIMESTONE
CRUSHED STONE

Distributors for

American Zinc sales Company

AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots, 24.40; pigs, 22.50, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 26.20; No. 43, 5% Si, 26.00; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 28.20; No. 195, 4.5% Cu, 0.8% Si, 27.60; No. 214, 3.8% Mg, 27.80; No. 356, 7% Si, 0.3% Mg, 26.20.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 46.00 deld. Conn. Valley; 46.00 deld. Midwest: custom smelters, 54.50 deld.; Lake, 46.00 deld.; Fire refined, 45.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$120 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 99+, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 32.50 f.o.b. Velasco, Tex.; ingot, 33.25 f.o.b. Velasco, Tex.

Magnesium Alloys: AZ91B (diecasting), 31.00 deld.; AZ63A, AZ92A, AZ91C (sand castings), 36.00 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $258-$260 per 76-lb flask.

Molybdenum: Powder, 99% hydrogen reduced, $3.20 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addtition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $90-$100 per troy oz, nom.

Palladium: $23-$24 per troy oz.

Platinum: $97-$111 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.50 per lb.

Silver: Open market, 91.125 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.50-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot and prompt, 100.625.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.45; grade A-2 (0.5% Fe max), $3.15 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced, $5.00. Treated ingot, $6.70.

Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld. Diecasting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.00 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 30.25-32.75; No. 12 foundry alloy (No. 2 grade), 29.00; 5% silicon alloy, 0.60 Cu max, 30.50-31.25; 13 alloy, 0.60 Cu max, 30.50-31.25; 195 alloy, 30.50-31.25; 108 alloy, 29.00-29.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 29.75-30.25; grade 2, 28.75; grade 3, 28.00; grade 4, 27.50-28.50.

Brass Ingot: Red brass, No. 115, 44.00; tin bronze, No. 225, 58.00; No. 245, 50.75; high-leaded tin bronze, No. 305, 47.75; No. 1 yellow, No. 405, 34.75; manganese bronze, No. 421, 39.25.

Magnesium Alloy Ingot: AZ63A, 34.00; AZ91B, 34.00; AZ91C, 34.90; AZ92A, 34.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.92; rod, bar, wire, $1.89.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 51.355-54.355; l.c.l., 51.98-54.98. Weatherproof, 30,000-lb lots, 48.28-50.53; l.c.l., 49.03-51.28. Magnetic wire deld., 15,000 lb or more, 58.68-61.84; l.c.l., 59.43-62.59.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANINUM

(Prices per lb, 10 000 lb and over, f.o.b. mill) Sheets, $13.10-$13.60; sheared mill plate, $10.50-$12.00; strip, $13.10-$13.60; wire, $9.50-$11.50; forging billets, $7.90-$8.15; hot-rolled and forged bars, $7.90-$8.15.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 23.00-24.00; ribbon zinc in coils, 21.50; plates, 20.00-22.25.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R.	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes, H.R.	87	74	93
Seamless Tubes	122	110	153

ALUMINUM

Screw Machine Stock: 30.000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	67.9	66.4	...	...
0.156-0.172	57.5	55.9	...	...
0.188	57.5	55.9	...	71.7
0.219-0.234	54.5	52.9	...	...
0.250-0.281	54.5	52.9	...	68.4
0.313	54.5	52.9	...	65.2
Cold-finished				
0.375-0.547	53.4	51.4	63.7	61.3
0.563-0.688	53.4	51.4	60.6	57.5
0.750-1.000	52.1	50.1	55.4	54.2
1.063	52.1	50.1	...	52.3
1.125-1.500	50.1	48.2	53.6	52.3
Rolled				
1.563	48.8	46.9	...	...
1.625-2.000	48.2	46.2	...	50.5
2.125-2.500	47.0	45.0	...	...
2.563-3.375	45.6	43.6	...	...

ALUMINUM

Sheet and Circle: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circles†
0.249-0.136	37.5	42.3	...	...
0.135-0.096	38.0	43.2	...	...
0.095-0.077	38.7	44.2	36.1	41.3
0.076-0.061	39.3	45.1	36.3	41.5
0.060-0.048	39.9	45.6	36.7	42.0
0.047-0.038	40.4	46.5	37.2	42.4
0.037-0.030	40.8	47.0	37.6	43.1
0.029-0.024	41.4	47.5	37.9	43.6
0.023-0.019	42.2	49.0	38.8	44.5
0.018-0.017	43.0	...	39.4	45.4
0.016-0.015	43.9	...	40.2	46.6
0.014	44.9	...	41.2	47.9
0.013-0.012	46.1	...	41.9	48.9
0.011	47.1	...	43.1	50.5
0.010-0.0095	48.4	...	44.3	52.2
0.009-0.0085	49.7	...	45.8	54.3
0.008-0.0075	51.3	...	47.0	56.1
0.007	52.8	...	48.5	58.4
0.006	54.4	...	49.9	63.4

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	36.5	40.8
5050-F	37.6	41.9
3004-F	38.6	43.8
5052-F	39.9	45.2
6061-T6	41.1	46.0
2024-T4*	43.6	49.9
7075-T6*	51.4	58.5

*24-48 in. widths or diam, 72-180 lengths.

ALUMINUM

Forging Stock: Round, Class 1, 39.10-50.10 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 43.00-56.20 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA Schedule 40, alloy 6063-T6, 20-ft lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
⅜	$16.85	2	$ 51.95
1	26.50	4	143.00
1¼	35.85	6	256.70
1½	42.90	8	386.30

MAGNESIUM

Sheet and Plate: AZ31A standard grade, .032 in., 99.00; .064 in., 78.00; .125 in., 63.50; .250-2.0 in., 61.00. AZ31A special grade, .032 in., 145.00; .064 in., 100.00; .125 in., 83.00; .250-2.0 in., 79.00. Tread plate, .125 in., 68.00; .250-3.0 in., 64.00. Tooling plate, .250-3.0 in., 65.00.

Extrusions	Com. Grade (FS)	Spec. Grade (AZ31B)
1 in. diam. rod	61.50	73.00
Shapes: 0.3 lb/ft	65.40-72.40	76.90-83.90
1.0 lb/ft	61.90-67.30	73.40-78.80
4.0 lb/ft	57.70-62.20	69.20-73.70
2 in. OD x ⅛ in. w. tubing	74.50	86.00

NONFERROUS SCRAP

DEALERS BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clipping, 20.00-20.50; old sheets, 17.00-17.50; borings and turnings, 11.00-11.50; crankcases, 17.00-17.50; industrial castings, 17.00-17.50.

Copper and Brass: No. 1 heavy copper and wire, 43.00-43.50; No. 2 heavy copper and wire, 41.00-41.50; light copper, 38.50-39.00; No. 1 composition red brass, 33.00-33.50; No. 1 composition turnings, 32.00-32.50; yellow brass

BRASS MILL PRICES*

	MILL PRODUCTS a				SCRAP ALLOWANCES f	
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	67.13b	64.36c	....	67.32	42.000	42.000	41.250
Yellow Brass	55.60	45.65d	56.14	58.51	31.250	31.000	29.000
Low Brass, 80%	60.15	60.09	60.69	62.96	35.375	35.125	34.625
Red Brass, 85%	61.79	61.73	62.33	64.60	37.000	36.750	36.250
Com. Bronze, 90%	63.98	63.92	64.52	66.54	38.500	38.250	37.750
Manganese Bronze	62.64-62.75	56.65-56.74	67.09	....	29.250	29.000	28.500
Muntz Metal	56.94	52.75	....	....	29.125	28.875	28.375
Naval Brass	58.90	53.21	65.96	62.06	29.000	28.750	28.250
Silicon Bronze	70.48	69.67	70.52	72.66e	40.750	40.500	39.750
Nickel Silver, 10%	69.20	71.53g	51.53	....	34.625	34.375	17.313
Phos. Bronze, A, 5%	85.37	85.87	85.87	87.05	42.625	42.375	41.375

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cents per lb. g. Leaded

* Based on copper at 46 cents a pound.

turnings, 19.50-20.50; new brass clippings, 28.00-28.50; light brass, 20.00-20.50; heavy yellow brass, 22.50-23.00; new brass rod ends, 26.50-27.00; auto radiators, unsweated, 25.00-25.50; cocks and faucets, 25.50-26.00; brass pipe, 26.00-26.50.

Lead: Heavy, 12.75-13.00; battery plates, 6.50-6.75; linotype and stereotype, 14.00-14.50; electrotype, 13.25-13.75; mixed babbitt, 15.50.

Magnesium: Clippings, 18.50-19.50; clean castings, 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings, 60.00-70.00; old sheets, 55.00-70.00; turnings, 50.00; rods, 59.50-70.00.

Nickel: Sheets and clips, 100.00-150.00; rolled anodes, 100.00-150.00; turnings, 85.00-125.00; rod ends, 100.00-150.00.

Zinc: Old zinc, 6.00-6.50; new die-cast scrap, 6.00; old die-cast scrap, 3.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clipping, 22.25-22.50; 3003 clippings, 22.00-22.50; 6151 clippings, 21.75-22.25; 5052 clippings, 21.75-22.25; 2014 clippings, 21.75; 2017 clippings, 21.50-21.75; 2024 clippings, 21.50-21.75; mixed clippings, 21.00-22.00; old sheet, 19.50-20.00; old cast, 19.50-20.00; clean old cable (free of steel), 21.75-22.25; borings and turnings, 19.50-20.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 68.00; light scrap, 63.00; turnings and borings, 48.00.

Copper and Brass: No. 1 heavy copper and wire, 46.50; No. 2 heavy copper and wire, 44.50; light copper, 43.00; refinery brass (60% copper) per dry copper content, 39.50.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 46.50; No. 2 heavy copper and wire, 44.50; light copper 43.00; No. 1 composition borings, 35.50; No. 1 composition solids, 36.00; heavy yellow brass solids, 26.00; yellow brass turnings, 25.00; radiators, 27.50-28.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 66.79; oval, 65.92, 5000-10,000 lb; electrodeposited, 61.25, 2000-5000 lb lots; cast, 58.85, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery, effective Jan. 1, 1955.

Tin: Bar or slab; less than 200 lb, $1.195; 200-499 lb, $1.180; 500-999 lb, $1.175; 1000 lb or more, $1.170.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb. in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 83.50; 1000 lb, 81.50.

Copper Sulphate: 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 43.50; 400-4900 lb, 41.50; 5000-9900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 15-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb, and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 71.90; 100-600 lb, 63.40; 700-1900 lb, 60.90; 2000-9900 lb, 59.20; 10,000 lb or more, 58.00.

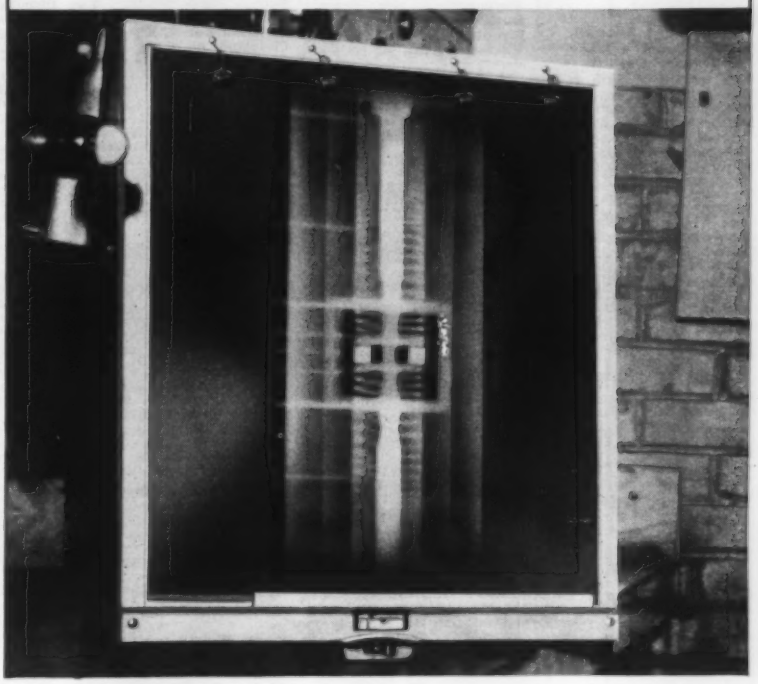
Stannous Chloride (anhydrous): Less than 25 lb, $1.690; 25 lb, $1.340; 100 lb, $1.190; 400 lb, $1.165; 5200-19,600 lb, $1.043; 20,000 lb or more, 92.10.

Stannous Sulphate: Less than 50 lb, $1.316; 50 lb, $1.016; 100-1900 lb, 99.60; 2000 lb or more, 97.60.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.

THERMALLOY* quality control at work

hell box



This test bar is burning up . . .

to make your furnace parts last longer

Above is an actual radiograph of an experimental alloy being subjected to extreme temperature conditions in our research laboratories. We use a battery of creep-testing furnaces to test alloys with varying loads . . . at temperatures ranging from 1200° to 2250° F.

Creep-testing is just one phase of Electro-Alloys Research and Quality Control. Our Elyria plant has a completely equipped laboratory for metallurgical study of any problem involving high-heat-resistant parts.

Let us put our facilities to work to solve *your* heat-treat problems. Call your local Electro-Alloys representative, or write for a copy of booklet T-225 "*Thermalloy Heat-Resistant Castings Give Longer Service Life.*" Electro-Alloys Division, 7007 Taylor St., Elyria, Ohio.

*Reg. U. S. Pat. Off.—designating not just one but a *group* of alloys —each developed to meet a specific heat and abrasion problem.

HEAT-RESISTANT CASTINGS • TRAYS • MUFFLES
RETORTS • CONVEYOR BELTS • RADIANT TUBES

AMERICAN Brake Shoe COMPANY

ELECTRO-ALLOYS DIVISION
Elyria, Ohio

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.*
Code numbers following mill points indicate producing company. Key to producers, page 185; to footnotes, page 187.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 ....$65.50

INGOTS, Alloy (NT)

Detroit R7 .....$69.00
Houston S5 .....74.00
Midland,Pa. C18 .....69.00
Munhall,Pa. U5 .....69.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Aliquippa,Pa. J5 ....$68.50
Bessemer,Pa. U5 .....68.50
Bridgeport,Conn. N19 ..73.50
Buffalo R2 .....68.50
Clairton,Pa. U5 .....68.50
Ensley,Ala. T2 .....68.50
Fairfield,Ala. T2 .....68.50
Fontana,Calif. K1 .....78.00
Gary,Ind. U5 .....68.50
Johnstown,Pa. B2 ....68.50
Lackawanna,N.Y. B2 ..68.50
LoneStar,Tex. L6 ....74.50
Munhall,Pa. U5 .....68.50
Pittsburgh J5 .....68.50
S.Chicago,Ill. R2, U5 ..68.50
S.Duquesne,Pa. U5 ....68.50
Youngstown R2 .....68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5 ....$84.50
Bessemer,Pa. U5 .....84.50
Bridgeport,Conn. N19 ..89.50
Buffalo R2 .....84.50
Canton,O. R2 .....86.50
Clairton,Pa. U5 .....84.50
Conshohocken,Pa. A3 ..89.50
Ensley,Ala. T2 .....84.50
Fairfield,Ala. T2 .....84.50
Fontana,Calif. K1 ....94.00
Gary,Ind. U5 .....84.50
Geneva,Utah C11 .....84.50
Houston S5 .....101.00
Johnstown,Pa. B2 ....84.50
Lackawanna,N.Y. B2 ..84.50
LosAngeles B3 .....94.00
Midland,Pa. C18 .....84.50
Munhall,Pa. U5 .....84.50
Pittsburgh J5 .....84.50
Seattle B3 .....98.00
S.Chicago R2,U5,W14 ..84.50
S.Duquesne,Pa. U5 ....84.50
S.SanFrancisco B3 ....94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ....$96.00
Buffalo R2 .....96.00
Canton,O. R2, T7 ....96.00
Conshohocken,Pa. A3..103.00
Detroit R7 .....96.00
Fontana,Calif. K1 ....117.00
Gary,Ind. U5 .....96.00
Houston S5 .....105.00
Ind.Harbor,Ind. Y1 ...96.00
Johnstown,Pa. B2 ....96.00
Lackawanna,N.Y. B2 ..96.00
LosAngeles B3 .....116.00
Massillon,O. R2 .....96.00
Midland,Pa. C18 .....96.00
Munhall,Pa. U5 .....96.00
S.Chicago R2,U5,W14 ..96.00
S.Duquesne,Pa. U5 ....96.00
Struthers,O. Y1 .....96.00
Warren,O. C17 .....96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$103.50
Canton,O. R2 .....103.50
Cleveland R2 .....103.50
Gary,Ind. U5 .....103.50
S.Chicago R2, W14 ...103.50
S.Duquesne,Pa. U5 ...103.50

SKELP

Aliquippa,Pa. J5 .....4.325
LoneStar,Tex. L6 .....4.625
Munhall,Pa. U5 .....4.225
SparrowsPoint,Md. B2..4.225
Warren,O. R2 .....4.225
Youngstown R2, U5 ...4.225

WIRE RODS

AlabamaCity,Ala. R2 ..5.375
Aliquippa,Pa. J5 .....5.375
Alton,Ill. L1 .....5.55
Buffalo W12 .....5.375
Cleveland A7 .....5.375
Donora,Pa. A7 .....5.375
Fairfield,Ala. T2 .....5.375
Houston S5 .....5.625
IndianaHarbor,Ind. Y1..5.375
Johnstown,Pa. B2 ....5.375
Joliet,Ill. A7 .....5.375
KansasCity,Mo. S5 ....5.625
Kokomo,Ind. C16 ....5.475
Los Angeles B3 .....6.175
Minnequa,Colo. C10 ...5.625
Monessen,Pa. P7 .....5.375
N.Tonawanda,N.Y. B11 5.375
Pittsburg,Calif. C11 ...5.675
Portsmouth,O. P12 .....5.375
Roebling,N.J. R5 .....5.475
S.Chicago,Ill. R2 .....5.375
SparrowsPoint,Md. B2..5.475
Sterling,Ill.(1) N15 ...5.375
Sterling,Ill. N15 .....5.475
Struthers,O. Y1 .....5.375
Worcester,Mass. A7 ...5.675

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....4.60
Aliquippa,Pa. J5 .....4.60
Bessemer,Ala. T2 .....4.60
Bethlehem,Pa. B2 .....4.65
Birmingham C15 .....5.10
Clairton,Pa. U5 .....4.60
Fairfield,Ala. T2 .....4.60
Fontana,Calif. K1 .....5.30
Gary,Ind. U5 .....4.60
Geneva,Utah C11 .....4.60
Houston S5 .....4.70
Ind.Harbor,Ind. I-2 ....4.60
Johnstown,Pa. B2 .....4.65
KansasCity,Mo. S5 ....4.70
Lackawanna,N.Y. B2 ...4.65
LosAngeles B3 .....5.30
Minnequa,Colo. C10 ....4.90
Munhall,Pa. U5 .....4.60
Niles,Calif. P1 .....5.25
Phoenixville,Pa. P4 ....5.15
Portland,Oreg. O4 .....5.35
Seattle B3 .....5.35
S.Chicago U5, W14 ....4.60
S.SanFrancisco B3 ....5.25
Torrance,Calif. C11 ....5.30
Weirton,W.Va. W6 ....4.60

Wide Flange

Bethlehem,Pa. B2 .....4.65
Clairton,Pa. U5 .....4.60
Fontana,Calif. K1 .....5.45
Lackawanna,N.Y. B2 ..4.65
Munhall,Pa. U5 .....4.60
Phoenixville,Pa. P4 ....5.15
S.Chicago,Ill. U5 .....4.60

Alloy Std. Shapes

Clairton,Pa. U5 .....5.65
Fontana,Calif. K1 ....7.40
Gary,Ind. U5 .....5.65
Houston S5 .....5.75
Munhall,Pa. U5 .....5.65
S.Chicago,Ill. U5 .....5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 .....6.75
Bessemer,Ala. T2 .....6.75
Bethlehem,Pa. B2 .....6.80
Clairton,Pa. U5 .....6.75
Fairfield,Ala. T2 .....6.75
Fontana,Calif. K1 .....7.45
Gary,Ind. U5 .....6.75
Geneva,Utah C11 .....6.75
Houston S5 .....6.85
Ind.Harbor,Ind. I-2, Y1..6.75
Johnstown,Pa. B2 .....6.80
KansasCity,Mo. S5 ....6.85
Lackawanna,N.Y. B2 ...6.80
LosAngeles B3 .....7.45
Munhall,Pa. U5 .....6.75
Seattle B3 .....7.50
S.Chicago,Ill U5, W14..6.75
S.SanFrancisco B3 ....7.40
Struthers,O. Y1 .....6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .....6.80
Lackawanna,N.Y. B2 ...6.80
Munhall,Pa. U5 .....6.75
S.Chicago,Ill. U5 .....6.75

PILING

BEARING PILES

Bethlehem,Pa. B2 ....4.65
Lackawanna,N.Y. B2 ...4.65
Munhall,Pa. U5 .....4.60
S.Chicago,Ill. U5 .....4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....5.45
Lackawanna,N.Y. B2 ...5.45
Munhall,Pa. U5 .....5.45
S.Chicago,Ill. U5 .....5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 .....4.50
Aliquippa,Pa. J5 .....4.50
Ashland,Ky.(15) A10 ...4.50
Bessemer,Ala. T2 .....4.50
Bridgeport,Conn. N19 ..4.75
Buffalo R2 .....4.50
Clairton,Pa. U5 .....4.50
Claymont,Del. C22 ....4.80
Cleveland J5, R2 .....4.60
Coatesville,Pa. L7 ....4.80
Conshohocken,Pa. A3 ...4.50
Detroit M1 .....4.60
Ecorse,Mich. G5 .....4.60
Fairfield,Ala. T2 .....4.50
Fontana,Calif.(30) K1 ..5.20
Gary,Ind. U5 .....4.50
Geneva,Utah C11 .....4.50
GraniteCity,Ill. G4 .....4.70
Harrisburg,Pa. P4 ....5.10
Houston S5 .....4.60
Ind.Harbor,Ind. I-2, Y1.4.50
Johnstown,Pa. B2 .....4.50
Lackawanna,N.Y. B2 ...4.50
LoneStar,Tex. L6 .....4.85
Mansfield,O. E6 .....4.50
Minnequa,Colo. C10 ....5.35
Munhall,Pa. U5 .....4.50
Newport,Ky. N9 .....4.50
Pittsburgh J5 .....4.50
Riverdale,Ill. A1 .....4.725
Seattle B3 .....5.40
Sharon,Pa. S3 .....4.50
S.Chicago R2, U5, W14..4.50
SparrowsPoint,Md. B2..4.50
Steubenville,O. W10 ....4.50
Warren,O. R2 .....4.50
Weirton,W.Va. W6 .....4.50
Youngstown R2, U5, Y1.4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 ....5.65
Fontana,Calif. K1 .....6.35
Geneva,Utah C11 .....5.65
Johnstown,Pa. B2 .....5.65
SparrowsPoint,Md. B2 ..5.65

PLATES, Wrought Iron

Economy,Pa. B14 .....10.40

PLATES, High Strength Low-Alloy

Aliquippa,Pa. J5 .....6.725
Bessemer,Ala T2 .....6.725
Clairton,Pa. U5 .....6.725
Cleveland J5, R2 .....6.725
Claymont,Del. C22 ....6.725
Coatesville,Pa. L7 ....7.025
Conshohocken,Pa. A3 ..6.725
Ecorse,Mich. G5 .....6.825
Fairfield,Ala. T2 .....6.725
Fontana,Calif.(30) K1 .7.425
Gary,Ind. U5 .....6.725
Geneva,Utah C11 .....6.725
Houston S5 .....6.825
Ind.Harbor,Ind. I-2, Y1.6.725
Johnstown,Pa. B2 .....6.725
Munhall,Pa. U5 .....6.725
Pittsburgh J5 .....6.725
Seattle B3 .....7.625
Sharon,Pa. S3 .....6.725
S.Chicago,Ill. U5, W14..6.725
SparrowsPoint,Md. B2..6.725
Warren,O. R2 .....6.725
Youngstown U5, Y1 ....6.725

PLATES, Alloy

Bridgeport,Conn. N19 ...6.55
Claymont,Del. C22 ....6.30
Coatesville,Pa. L7 .....6.30
Fontana,Calif. K1 .....7.00
Gary,Ind. U5 .....6.30
Houston S5 .....6.40
Ind.Harbor,Ind. Y1 ....6.30
Johnstown,Pa. B2 .....6.30
Munhall,Pa. U5 .....6.30
Newport,Ky. N9 .....6.30
Seattle B3 .....7.20
Sharon,Pa. S3 .....6.30
S.Chicago,Ill. U5, W14..6.30
SparrowsPoint,Md. B2 ..6.30
Youngstown Y1 .....6.30

FLOOR PLATES

Cleveland J5 .....5.575
Conshohocken,Pa. A3 ..5.575
Harrisburg,Pa. P4 ....5.575
Ind.Harbor,Ind. I-2 ....5.575
Munhall,Pa. U5 .....5.575
S.Chicago,Ill. U5 .....5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10...4.75
Ashland l.c.l. (15) A10..5.25
Cleveland c.l. R2 .....5.10
Warren,O. c.l. R2 ....5.10

BARS

(Commercial Quality)

BARS, Hot-Rolled Carbon

Ala.City,Ala.(9) R2 ....4.65
Aliquippa,Pa.(9) J5 ....4.65
Alton,Ill. L1 .....4.85
Atlanta A11 .....4.85
Bessemer,Ala.(9) T2 ...4.65
Birmingham C15 .....5.15
Bridgeport,Conn. N19 ..4.80
Buffalo(9) R2 .....4.65
Canton,O.(9) R2 .....4.75
Clairton,Pa.(9) U5 ....4.65
Cleveland(9) R2 .....4.65
Ecorse,Mich.(9) G5 ....4.75
Emeryville,Calif. J7 ....5.40
Fairfield,Ala.(9) T2 ....4.65
Fairless,Pa.(9) U5 .....4.80
Fontana,Calif. K1 .....5.35
Gary,Ind.(9) U5 .....4.65
Houston(9) S5 .....4.90
Ind.Harbor,Ind.(9) I-2..4.65
Ind.Harbor,Ind. Y1 ....4.65
Johnstown,Pa.(9) B2 ...4.65
Joliet,Ill. P22 .....5.15
KansasCity,Mo.(9) S5 ..4.90
Lackawanna(9) B2 .....4.65
LosAngeles(9) B3 .....5.35
Massillon,O.(9) R2 .....4.75
Midland,Pa.(9) C18 ....4.65
Milton,Pa. M18 .....4.80
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
N.T'wanda,N.Y.(9) B11 4.65
Pittsburg,Calif.(9) C11..5.35
Pittsburgh(9) J5 .....4.65
Portland,Oreg. O4 ....5.40
Seattle B3, N14 .....5.40
S.Chicago W14 .....4.65
S.Chicago,Ill.(9) R2, U5 4.65
S.Duquesne,Pa.(9) U5 ..4.65
S.SanFran.,Calif.(9) B3 5.40
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif(9) C11 ..5.35
Warren,O.(9) R2 .....4.65
Weirton,W.Va.(9) W6 ..4.65
Youngston(9) R2, U5 ...4.65

BARS, H.R. Leaded Alloy

Warren,O. C17 .....6.575

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 ....5.575
Bridgeport,Conn. N19 ..5.725
Buffalo R2 .....5.575
Canton,O. R2, T7 ....5.575
Clairton,Pa. U5 .....5.575
Detroit R7 .....5.575
Ecorse,Mich. G5 .....5.675
Fairless,Pa. U5 .....5.725
Fontana,Calif. K1 ....6.625
Gary,Ind. U5 .....5.575
Houston S5 .....5.825
Ind.Harbor,Ind. I-2, Y1.5.575
Johnstown,Pa. B2 .....5.575
KansasCity,Mo. S5 ....5.825
Lackawanna,N.Y. B2..5.575
LosAngeles B3 .....6.625
Massillon,O. R2 .....5.575
Midland,Pa. C18 .....5.575
S.Chicago R2, U5, W14.5.575
S.Duquesne,Pa. U5 ....5.575
Struthers,O. Y1 .....5.575
Warren,O. C17 .....5.575
Youngstown U5 .....5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 .....6.80
Bessemer,Ala. T2 .....6.80
Bethlehem,Pa. B2 .....6.80
Clairton,Pa. U5 .....6.80
Cleveland R2 .....6.80
Ecorse,Mich. G5 .....6.90
Fairfield,Ala. T2 .....6.80
Fontana,Calif. K1 .....7.50
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
Ind.Harb.,Ind. I-2, Y1..6.80
Johnstown,Pa. B2 .....6.80
KansasCity,Mo. S5 ....7.05
Lackawanna,N.Y. B2 ...6.80
LosAngeles B3 .....7.50
Pittsburgh J5 .....6.80
Seattle B3 .....7.55
S.Chicago W14 .....6.80
S.Duquesne,Pa. U5 ....6.80
S.SanFrancisco B3 ....7.55
Struthers,O. Y1 .....6.80
Warren,O. R2 .....6.80
Youngstown U5 .....6.80

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ...4.80
Lackawanna(9) B2 ....4.65

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .....4.65
Atlanta A11 .....4.85
Fontana,Calif. K1 ....5.35
Joliet,Ill. P22 .....5.10
Niles,Calif. P1 .....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
Seattle B3 .....5.40
SparrowsPoint,Md. B2 ..5.40
Torrance,Calif. C11 ....5.45
Warren,O. R2 .....5.40
Youngstown U5 .....5.65

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 .....5.65
Gary,Ind. U5 .....5.65
Houston S5 .....5.90
KansasCity,Mo. S5 ....5.90
Youngstown U5 .....5.65

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18 ....8.325
Camden,N.J. P13 .....8.35
Chicago W18 .....8.325
Cleveland C20 .....8.325
Monaca,Pa. S17 .....8.325
Newark,N.J. W18 .....8.50
SpringCity,Pa. K3 .....8.30
Warren,O. C17 .....8.575

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .....6.25
BeaverFalls,Pa. M12,R2 6.25
Buffalo B5 .....6.30
Camden,N.J. P13 .....6.70
Carnegie,Pa. C12 .....6.25
Chicago W18 .....6.25
Cleveland A7, C20 ....6.25
Detroit B5, P17 .....6.45
Detroit R7 .....6.25
Donora,Pa. A7 .....6.25
Elyria,O. W8 .....6.25
FranklinPark,Ill. N5 ...6.25
Gary,Ind. R2 .....6.25
GreenBay,Wis. F7 .....6.25
Hammond,Ind. L2, M13.6.25
Hartford,Conn. R2 ....6.75
Harvey,Ill. B5 .....6.25
LosAngeles(49) S30 ....7.70
LosAngeles R2 .....7.70
Mansfield,Mass. B5 ....6.80
Massillon,O. R2, R8 ...6.25
Midland,Pa. C18 .....6.25
Monaca,Pa. S17 .....6.25
Newark,N.J. W18 .....6.70
NewCastle,Pa.(17) B4..6.25
Pittsburgh J5 .....6.25
Plymouth,Mich. P5 ....6.50
Putnam,Conn. W18 ....6.80
Readville,Mass. C14 ...6.80
S.Chicago,Ill. W14 ....6.25
SpringCity,Pa. W3 .....6.70
Struthers,O. Y1 .....6.25
Waukegan,Ill. A7 .....6.25
Worcester,Mass. W19 ...6.70
Youngstown F3, Y1 ....6.25

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19.5.16

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 .....7.425
BeaverFalls,Pa. M12,R2 7.425
Bethlehem,Pa. B2 .....7.425
Buffalo B5 .....7.425
Camden,N.J. P13 .....7.60
Canton,O. T7 .....7.425
Carnegie,Pa. C12 .....7.425
Chicago W18 .....7.425
Cleveland A7, C20 ....7.425
Detroit R7 .....7.425
Detroit B5, P17 .....7.625
Donora,Pa. A7 .....7.425
Elyria,O. W8 .....7.425
Gary,Ind. R2 .....7.425
GreenBay,Wis. F7 .....7.425
Hammond,Ind. L2, M13.7.425
Hartford,Conn. R2 ....7.725
Harvey,Ill. B5 .....7.425
Lackawanna,N.Y. B2 ..7.425
LosAngeles S30 .....9.10
Mansfield,Mass. B5 ...7.725
Massillon,O. R2, R8 ...7.425
Midland,Pa. C18 .....7.425
Monaca,Pa. S17 .....7.425
Newark,N.J. W18 .....7.60
Plymouth,Mich. P5 ....7.625
S.Chicago W14 .....7.425
SpringCity,Pa. K3 .....7.60
Struthers,O. Y1 .....7.425
Warren,O. C17 .....7.425
Waukegan,Ill. A7 .....7.425
Worcester,Mass. A7 ...7.725
Youngstown F3, Y1 ....7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 .....4.65
Atlanta A11 .....4.85
Birmingham C15 .....5.15
Buffalo R2 .....4.65
Cleveland R2 .....4.65
Ecorse,Mich. G5 .....4.75
Emeryville,Calif. J7 ...5.40
Fairfield,Ala. T2 .....4.65
Fairless,Pa. U5 .....4.80
Fontana,Calif. K1 ....5.35
Ft.Worth,Tex.(42) T4 ..5.10
Gary,Ind. U5 .....4.65
Houston S5 .....4.90

Ind. Harbor, Ind. I-2, Y1 4.65
Johnstown, Pa. B2 ..... 4.65
Joliet, Ill. P22 ..... 5.15
Kansas City, Mo. S5 ..... 4.90
Lackawanna, N.Y. B2 .. 4.65
Los Angeles B3 ..... 5.35
Milton, Pa. M18 ..... 4.80
Minnequa, Colo. C10 .... 5.10
Niles, Calif. P1 ..... 5.35
Pittsburg, Calif. C11 .... 5.35
Pittsburgh J5 ..... 4.65
Portland, Oreg. O4 ..... 5.40
Sand Springs, Okla. S5 .. 5.15
Seattle B3, N14 ..... 5.40
S. Chicago R2 ..... 4.65
S. Duquesne, Pa. U5 .... 4.65
S. San Francisco B3 .... 5.40
Sparrows Point, Md. B2 .. 4.65
Sterling, Ill. (1) N15 .... 4.65
Sterling, Ill. N15 ..... 4.75
Struthers, O. Y1 ..... 4.65
Torrance, Calif. C11 .... 5.35
Youngstown R2, U5 .... 4.65

BARS, Reinforcing (Fabricated; to Consumers)

Johnstown, Pa. ¼-1" B2 6.15
Kansas City, Kans. S5 .. 6.45
Lackawanna, N.Y. B2 .. 6.17
Marion, O. P11 ..... 6.15
Pittsburgh U8 ..... 6.17
Seattle B3, N14 ..... 6.60
Sparrows Pt. ½-1" B2 .. 6.15
Williamsport, Pa. S19 ... 6.00

RAIL STEEL BARS

Chicago Hts. (3) C2, I-2 .. 4.65
Chicago Hts. (4) C2, I-2 .. 4.65
Ft. Worth, Tex. (26) T4 .. 5.10
Franklin, Pa (3) F5 .... 4.65
Franklin, Pa. (4) F5 .... 4.65
Jersey Shore, Pa. (4) J8 .. 4.65
Marion, O. (3) P11 .... 4.65
Moline, Ill. (3) R2 ..... 4.80
Tonawanda (3) B12 .... 4.65
Tonawanda (4) B12 .... 5.15
Williamsport, Pa. (3) S19 .. 4.65

BARS, Wrought Iron

Economy, Pa. (S.R.) B14 11.50
Economy, Pa. (D.R.) B14 14.30
Economy (Staybolt) B14 14.65
McK. Rks. (S.R.) L5 .. 11.50
McK. Rks. (D.R.) L5 .. 16.00
McK. Rks. (Staybolt) L5 17.00

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala. City, Ala. R2 .... 4.325
Allenport, Pa. P7 .... 4.325
Ashland, Ky. (8) A10 .... 4.325
Cleveland J5, R2 .... 4.325
Conshohocken, Pa. A3 .. 4.375
Detroit (8) M1 ..... 4.425
Dravosburg, Pa. U5 .... 4.325
Ecorse, Mich. G5 ..... 4.425
Fairfield, Ala. T2 .... 4.325
Fairless, Pa. U5 ..... 4.375
Fontana, Calif. K1 .... 5.125
Gary, Ind. U5 ..... 4.325
Geneva, Utah C11 .... 4.425
Granite City, Ill. G4 .... 4.525
Ind. Harbor, Ind. I-2, Y1 4.325
Lackawanna, N.Y. B2 .. 4.325
Mansfield, O. E6 (37) .. 4.325
Munhall, Pa. U5 ..... 4.325
Newport, Ky. (8) N9 .... 4.325
Niles, O. M21 ..... 4.325
Pittsburg, Calif. C11 .... 5.025
Pittsburgh J5 ..... 4.325
Portsmouth, O. P12 .... 4.325
Riverdale, Ill. A1 ..... 4.55
Sharon, Pa. S3 ..... 4.325
S. Chicago, Ill. W14 .... 4.325
Sparrows Point, Md. B2 .. 4.325
Steubenville, O. W10 .. 4.325
Warren, O. R2 ..... 4.325
Weirton, W. Va. W6 .... 4.325
Youngstown U5, Y1 .. 4.325

SHEETS, H.R. (19 Ga. & Lighter)

Ala. City, Ala. R2 ..... 5.625
Niles, O. M21 ..... 5.325

SHEETS, H.R. Alloy

Ind. Harbor, Ind. Y1 .... 7.20
Youngstown Y1 ..... 7.20

SHEETS, H.R. (14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2 .... 6.375
Conshohocken, Pa. A3 .. 6.425
Dravosburg, Pa. U5 .. 6.375
Ecorse, Mich. G5 ..... 6.475
Fairfield, Ala. T2 ..... 6.375
Fairless, Pa. U5 ..... 6.425
Fontana, Calif. K1 .... 7.175
Gary, Ind. U5 ..... 6.375
Ind. Harbor, Ind. I-2, Y1 6.375
Lackawanna (35) B2 .. 6.375
Munhall, Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
Sharon, Pa. S3 ..... 6.375
S. Chicago, Ill. U5 ..... 6.375
Sparrows Point (36) B2 6.375
Warren, O. R2 ..... 6.375
Youngstown U5, Y1 .. 6.375

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland, Ky. (8) A10 .... 4.575
Ind. Harbor, Ind. I-2 .... 4.575

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport, Pa. P7 .... 5.325
Cleveland J5, R2 .... 5.325
Conshohocken, Pa. A3 .. 5.375
Dravosburg, Pa. U5 .... 5.325
Detroit M1 ..... 5.325
Ecorse, Mich. G5 ..... 5.425
Fairfield, Ala. T2 ..... 5.325
Fairless, Pa. U5 ..... 5.375
Follansbee, W. Va. F4 .. 5.325
Fontana, Calif. K1 .... 6.525
Gary, Ind. U5 ..... 5.325
Granite City, Ill. G4 .... 5.525
Ind. Harbor, Ind. I-2, Y1 5.325
Lackawanna, N.Y. B2 .. 5.325
Mansfield, O. E6 ..... 5.325
Middletown, O. A10 .... 5.325
Newport, Ky. N9 ..... 5.325
Pittsburg, Calif. C11 .. 6.275
Pittsburgh J5 ..... 5.325
Portsmouth, O. P12 .... 5.325
Sparrows Point, Md. B2 .. 5.325
Steubenville, O. W10 .. 5.325
Warren, O. R2 ..... 5.325
Weirton, W. Va. W6 .... 5.325
Youngstown Y1 ..... 5.325

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 .... 7.875
Dravosburg, Pa. U5 .... 7.875
Ecorse, Mich. G5 ..... 7.975
Fairless, Pa. U5 ..... 7.925
Fontana, Calif. K1 .... 9.075
Gary, Ind. U5 ..... 7.875
Indiana Harbor, Ind. Y1 7.875
Lackawanna (37) B2 .. 7.875
Pittsburgh J5 ..... 7.875
Sparrows Point (38) B2 .. 7.875
Warren, O. R2 ..... 7.875
Weirton, W. Va. W6 .... 7.875
Youngstown Y1 ..... 7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown, O. A10 .... 5.825

SHEETS, Culvert (16 Gage)

	Cu	Cu
	Alloy	Fe
Ashland, Ky. A10	6.90	...
Canton, O. R2	6.10	6.55
Dravosburg U5	6.10	...
Fairfield T2	6.10	...
Gary, Ind. U5	6.10	6.35
Ind. Harbor I-2	6.10	6.35
Kokomo, Ind. C16	6.20	...
Martins Fry. W10	6.10	...
Newport, Ky. N9	6.10	6.35
Pitts., Calif. C11	6.85	...
Sparrows Pt. B2	6.10	...

SHEETS, Culvert—Pure Iron

Ashland, Ky. A10 ..... 7.15
Gary, Ind. U5 ..... 6.35
Martins Fry, O. W10 .... 6.35

SHEETS, Galvanized Steel Hot-Dipped

Ala. City, Ala. R2 ..... 5.85‡
Ashland, Ky. A10 .... 5.85†
Canton, O. R2 ..... 5.85‡
Dover, O. R1 ..... 5.85†
Dravosburg, Pa. U5 .... 5.85†
Fairfield, Ala. T2 ..... 5.85†
Gary, Ind. U5 ..... 5.85*
Granite City, Ill. G4 .... 6.05
Ind. Harbor, Ind. I-2 .... 5.85†
Kokomo, Ind. C16 .... 5.95‡
Martins Ferry, O. W10 .. 5.85*
Middletown, O. A10 .... 5.85†
Newport, Ky. N9 ..... 5.85‡
Pittsburg, Calif. C11 .. 6.60*
Pittsburgh J5 ..... *5.85†*
Sparrows Pt., Md. B2 .. 5.85†
Warren, O. R2 ..... 5.85†
Weirton, W. Va. W6 .. 5.85*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana, Calif. K1 .... 6.625

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg, Pa. U5 .... 8.60
Sparrows Point (39) B2 .. 8.60

SHEETS, Galvannealed Steel

Canton, O. R2 ..... 6.25
Dravosburg, Pa. U5 .... 6.25
Kokomo, Ind. C16 ..... 6.60
Newport, Ky. N9 ..... 6.25

SHEETS, Galvanized Ingot Iron (Hot-dipped Continuous)

Ashland, Ky. A10 ..... 6.10
Middletown, O. A10 .... 6.10

SHEETS, Electrogalvanized

Cleveland (28) R2 ..... 6.70
Niles, O. (28) R2 ..... 6.70
Weirton, W. Va. W6 .... 6.55

SHEETS, Aluminum Coated

Butler, Pa. A10 (type 1) 8.50
Butler, Pa. A10 (type 2) 8.60

SHEETS, Enameling Iron

Ashland, Ky. A10 ..... 5.90
Cleveland R2 ..... 5.90
Dravosburg, Pa. U5 .... 5.90
Gary, Ind. U5 ..... 5.90
Granite City, Ill. G4 .... 6.10
Ind. Harbor, Ind. I-2 .... 5.90
Middletown, O. A10 .... 5.90
Niles, O. M21 ..... 5.90
Youngstown Y1 ..... 5.90

BLUED STOCK, 29 Gage

Follansbee, W. Va. F4 .. 7.75
Ind. Habor, Ind. I-2 .... 7.75
Yorkville, O. W10 ..... 7.75

SHEETS, Long Terne Steel (Commercial Quality)

Beech Bottom, W. Va. W10 6.25
Gary, Ind. U5 ..... 6.25
Mansfield, O. E6 ..... 6.25
Middletown, O. A10 .... 6.25
Niles, O. M21 ..... 6.25
Weirton, W. Va. W6 .... 6.25

SHEETS, Long Terne, Ingot Iron

Middletown, O. A10 .... 6.65

Key To Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel&Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel&Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel&Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine&Special Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U.S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New Eng. High Carb. Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv., EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Senaca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Division, H. K. Porter, Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel&Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.325
Allenport,Pa. P7	4.325
Alton,Ill. L1	4.50
Ashland,Ky.(8) A10	4.325
Atlanta A11	4.525
Bessemer,Ala. T2	4.325
Birmingham C15	4.325
Bridgeport,Conn. N19	4.625
Buffalo(27) R2	4.325
Conshohocken,Pa. A3	4.375
Detroit M1	4.425
Ecorse,Mich. G5	4.425
Fairfield,Ala. T2	4.325
Fontana,Calif. K1	5.125
Gary,Ind. U5	4.325
Ind.Harbor,Ind. I-2,Y1	4.325
Johnstown,Pa.(25) B2	4.525
Lackaw'na,N.Y.(24) B2	4.325
LosAngeles(25) B3	5.075
Milton,Pa. M18	4.325
Minnequa,Colo. C10	5.425
Pittsburg,Calif. C11	5.075
Riverdale,Ill. A1	4.55
SanFrancisco S7	5.05
Seattle(25) B3	5.325
Seattle N14	5.40
Sharon,Pa. S3	4.325
S.Chicago,Ill. W14	4.325
S.SanFrancisco(25) B3	5.075
SparrowsPoint,Md. B2	4.325
Sterling(1) N15	4.325
Sterling,Ill. N15	4.425
Torrance,Calif. C11	5.075
Warren,O. R2	4.325
Weirton,W.Va. W6	4.325
Youngstown U5	4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19	7.50
Carnegie,Pa. S18	7.20
Fontana,Calif. K1	8.95
Gary,Ind. U5	7.20
Ind.Harbor,Ind. Y1	7.20
LosAngeles B3	8.40
Newport,Ky. N9	7.20
Sharon,Pa. S3	7.20
S.Chicago W14	7.20
Youngstown U5, Y1	7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2	6.425
Conshohocken,Pa. A3	6.425
Ecorse,Mich. G5	6.525
Fairfield,Ala. T2	6.425
Fontana,Calif. K1	7.575
Gary,Ind. U5	6.425
Houston S5	6.675
Ind.Harbor,Ind. I-2, Y1	6.425
KansasCity,Mo. S5	6.675
Lackawanna,N.Y. B2	6.425
LosAngeles(25) B3	7.175
Seattle(25) B3	7.425
Sharon,Pa. S3	6.425
S.SanFrancisco(25) B3	7.175
SparrowsPoint,Md. B2	6.425
Warren,O. R2	6.425
Weirton,W.Va. W6	6.425
Youngstown U5, Y1	6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.25
Baltimore T6	6.25
Boston T6	6.80
Buffalo S40	6.25
Cleveland A7, J5	6.25
Conshohocken,Pa. A3	6.30
Dearborn,Mich. D3	6.35
Detroit D2, M1, P20	6.35
Dover,O. G6	6.25
Ecorse,Mich. G5	6.35
Follansbee,W.Va. F4	6.25
Fontana,Calif. K1	8.00
FranklinPark,Ill. T6	6.35
Ind.Harbor,Ind. I-2	6.35
Ind.Harbor,Ind. Y1	6.25
Indianapolis C8	6.40
Lackawanna,N.Y. B2	6.25
LosAngeles C1	8.30
NewBedford,Mass. R10	6.70
NewBritain(10) S15	6.25
NewCastle,Pa. B4, E5	6.25
NewHaven,Conn. A7, D2	6.70
NewKensington,Pa. A6	6.25
Pawtucket, R.I. R3	6.90
Pawtucket,R.I. N8	6.80
Pittsburgh J5	6.25
Riverdale,Ill. A1	6.35
Rome,N.Y.(32) R6	6.25
Sharon,Pa. S3	6.25
SparrowsPt.,Md. B2	6.25
Trenton,N.J.(31) R5	7.80
Wallingford,Conn. W2	6.70
Warren,O. R2, T5	6.25
Weirton,W.Va. W6	6.25
Worcester,Mass. A7	6.80
Youngstown C8, Y1	6.25

STRIP, Cold-Rolled Alloy

Boston T6	13.80
Carnegie,Pa. S18	13.45
Cleveland A7	13.45
Dover,O. G6	13.45
FranklinPark,Ill. T6	13.45
Harrison,N.J. C18	13.45
Indianapolis C8	13.60
Pawtucket,R.I. N8	13.80
Sharon,Pa. S3	13.45
Worcester,Mass. A7	13.75
Youngstown C8	13.45

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7	9.10
Dearborn,Mich. D3	9.20
Dover,O. G6	9.30
Ecorse,Mich. G5	9.20
Ind.Harbor,Ind. Y1	9.30

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.40	9.35	10.90	13.05	15.75
Boston T6	7.65	9.35	10.90	13.05	15.75
Bristol,Conn. W1	...	...	10.90	13.05	15.75
Carnegie,Pa. S18	...	9.05	10.60	12.75	....
Cleveland A7	7.10	9.05	10.60	12.75	15.45
Cleveland C7	...	9.05	10.60	12.75	15.45
Dearborn,Mich. D3	7.20	9.15	10.70	....	....
Detroit D2	7.20	9.15	10.70	12.85	....
Dover,O. G6	7.10	9.05	10.60	12.75	15.45
FranklinPark,Ill. T6	7.20	9.05	10.60	12.75	15.45
Harrison,N.J. C18	...	...	10.90	13.05	15.75
Indianapolis C8	7.25	9.20	10.60	12.75	15.45
NewBritain,Conn.(10) S15	7.10	9.05	10.60	12.75	15.45
NewCastle,Pa. B4, E5	7.10	9.05	10.60	12.75	....
NewHaven,Conn. D2	7.55	9.35	10.90	13.05	....
NewKensington,Pa. A6	7.10	9.05	10.60	....	....
NewYork W3	...	9.35	10.90	13.05	15.75
Pawtucket,R.I. N8	7.65	9.35	10.90	13.05	15.75
Riverdale,Ill. A1	7.20	9.05	10.60	12.75	15.45
Rome,N.Y.(32) R6	7.10	9.05	10.60	12.75	15.45
Sharon,Pa. S3	7.10	9.05	10.60	12.75	15.45
Trenton,N.J. R5	...	9.35	10.90	13.05	15.75
Wallingford,Conn. W2	7.55	9.35	10.90	13.05	15.75
Warren,O. T5	7.10	9.05	10.60	12.75	15.45
Weirton,W.Va. W6	7.10	9.05	10.60	12.75	15.45
Worcester,Mass. A7, T6	7.65	9.35	10.90	13.05	15.75
Youngstown C8	7.10	9.05	10.60	12.75	15.45

Spring Steel (Tempered)

Bristol,Conn. W1	...	...	14.80	18.15	....
Buffalo W12	...	...	14.80	....	....
FranklinPark,Ill. T6	...	...	15.15	18.50	22.35
Harrison,N.J. C18	...	...	14.80	18.15	22.00
NewYork W3	...	...	14.80	18.15	22.00
Trenton,N.J. R5	...	...	14.80	18.15	22.00
Worcester,Mass. W12	...	...	14.80	....	....
Worcester,Mass. A7, T6	...	...	14.80	18.15	22.00
Youngstown C8	...	...	15.15	18.50	22.35

SILICON STEEL

H.R. SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. M21	8.40	9.35	9.95	10.95	....
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	....	....	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	....
IndianaHarbor,Ind. I-2	8.60†	9.60*	10.20*	11.20*	....
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Vandergrift,Pa. U5	...	10.10†	10.70†	11.70†	12.60†
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	....	....	....
Newport,Ky. N9	12.80	....	....	....
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80§	13.35§	13.85§	14.85§

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	15.85	17.45	17.95	18.45	13.55**
Butler,Pa. A10	....	....	17.45	17.95	....	....
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	....	13.55
Warren,O. R2	....	....	....	....	....	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.90	$8.15	$8.55
Dravosburg,Pa. U5	7.90	8.15	8.55
Fairfield,Ala. T2	8.00	8.25	8.65
Fairless,Pa. U5	8.00	8.25	8.65
Gary,Ind. U5	7.90	8.15	8.55
GraniteCity,Ill. G4	8.00	8.25	8.65
IndianaHarbor,Ind. I-2, Y1	7.90	8.15	8.55
Niles,O. R2	7.90	8.15	8.55
Pittsburg,Calif. C11	8.65	8.90	9.30
SparrowsPoint,Md. B2	8.00	8.25	8.65
Weirton,W.Va. W6	7.90	8.15	8.55
Yorkville,O. W10	7.90	8.15	8.55

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa. J5	6.675	....	....
Niles,O. R2	6.675	6.875	7.075

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.20	$9.45
Dravosburg,Pa.U5	9.20	9.45
Fairfield,Ala. T2	9.30	9.55
Fairless,Pa. U5	9.30	9.55
Gary,Ind. U5	9.20	9.45
Ind.Har. I-2, Y1	9.20	9.45
Pitts.,Calif. C11	9.95	10.20
Sp.Pt.,Md. B2	9.30	9.55
Weirton,W.Va. W6	9.20	9.45
Yorkville,O. W10	9.20	9.45

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$7.00
Dravosburg,Pa. U5	7.00
Fairfield,Ala. T2	7.10
Fairless,Pa. U5	7.10
Gary,Ind. U5	7.00
GraniteCity,Ill. G4	7.10
Ind.Harbor,Ind. I-2, Y1	7.00
Niles,O. R2	7.00
Pittsburg,Calif. C11	7.75
SparrowsPoint,Md. B2	7.10
Warren,O. R2	7.00
Weirton,W.Va. W6	7.00
Yorkville,O. W10	7.00

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	6.65
Gary,Ind. U5	6.65
GraniteCity,Ill. G4	6.75
Ind.Harbor,Ind. Y1	6.65
Yorkville,O. W10	6.65

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	$8.70
Gary,Ind. U5	8.70
Yorkville,O. W10	8.70

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10	$9.15

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	$10.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	6.60
Aliquippa,Pa. J5	6.60
Alton,Ill. L1	6.775
Atlanta A11	6.80
Bartonville,Ill. K4	6.35
Buffalo W12	6.60
Chicago W13	6.60
Cleveland A7	6.60
Crawfordsville,Ind. M8	6.70
Donora,Pa. A7	6.60
Duluth,Minn. A7	6.60
Fairfield,Ala. T2	6.60
Fostoria,O.(24) S1	6.80
Houston S5	6.85
Jacksonville,Fla. M8	6.95
Johnstown,Pa. B2	6.60
Joliet,Ill. A7	6.60
KansasCity,Mo. S5	6.85
Kokomo,Ind. C16	6.70
LosAngeles B3	7.55
Minnequa,Colo. C10	6.85
Monessen,Pa. P7	6.60
Newark 6-8 ga. I-1	6.90
N.Tonawanda B11	6.60
Palmer,Mass. W12	6.90
Pittsburg,Calif. C11	7.20
Portsmouth,O. P12	6.60
Rankin,Pa. A7	6.60
S.Chicago,Ill. R2	6.60
S.SanFrancisco C10	7.55
SparrowsPoint,Md. B2	6.70
Sterling,Ill.(1) N15	6.60
Sterling,Ill. N15	6.70
Struthers,O. Y1	6.60
Waukegan,Ill. A7	6.60
Worcester,Mass. A7	6.90

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	7.90
Alton,Ill. L1	8.075
Bartonville,Ill. K4	8.00
Buffalo W12	7.90
Cleveland A7	7.90
Donora,Pa. A7	7.90
Duluth,Minn. A7	7.90
Fostoria,O. S1	7.95
Johnstown,Pa. B2	7.90
LosAngeles B3	8.85
Milbury,Mass.(12) N6	8.20
Minnequa,Colo. C10	8.15
Monessen,Pa. P16	7.90
Muncie,Ind. I-7	8.10
Palmer,Mass. W12	8.20
Pittsburg,Calif. C11	8.85
Portsmouth,O. P12	7.90
Roebling,N.J. R5	8.20
S.Chicago,Ill. R2	7.90
S.SanFrancisco C10	8.85
SparrowsPt.,Md. B2	8.00
Struthers,O. Y1	7.90
Trenton,N.J. A7	8.20
Waukegan,Ill. A7	7.90
Worcester A7,J4,T6,W12	8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	7.60
Alton,Ill. L1	7.775
Buffalo W12	7.60
Cleveland A7	7.60
Donora,Pa. A7	7.60
Duluth,Minn. A7	7.60
Johnstown,Pa. B2	7.60
KansasCity,Mo. S5	7.85
LosAngeles B3	8.55
Minnequa,Colo. C10	7.775
Monessen,Pa. P16	7.60
NewHaven,Conn. A7	7.90
Palmer,Mass. W12	7.90
Pittsburg,Calif. C11	8.55
Portsmouth,O. P12	7.60
Roebling,N.J. R5	7.90
S.Chicago,Ill. R2	7.60
S.SanFrancisco C10	8.55
SparrowsPoint,Md. B2	7.70
Struthers,O. Y1	7.60
Trenton,N.J. A7	7.90
Waukegan,Ill. A7	7.60
Worcester,Mass. A7	7.90

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1	12.725
Bartonville,Ill. K4	12.65
Buffalo W12	12.55
Chicago W13	12.55
Cleveland A7	12.55
Crawfordsville,Ind. M8	12.65
Fostoria,O. S1	12.55
Jacksonville,Fla. M8	12.90
Johnstown,Pa. B2	12.55
Kokomo,Ind. C16	12.55
Minnequa,Colo. C10	12.30
Monessen,Pa. P6	12.55
Muncie,Ind. I-7	12.75
Palmer,Mass. W12	12.85
Roebling,N.J. R5	12.85
S.SanFrancisco C10	12.90
Waukegan,Ill. A7	12.55
Worcester,Mass. A7,T6	12.85

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	10.70
Buffalo W12	10.70
Johnstown,Pa. B2	10.70
Minnequa,Colo. C10	10.825
Monessen,Pa. P16	10.70
Muncie,Ind. I-7	10.90
Palmer,Mass. W12	11.00
Pittsburg,Calif. C11	11.50
Portsmouth,O. P12	10.70
Roebling,N.J. R5	11.00
SparrowsPt.,Md. B2	10.80
Struthers,O. Y1	10.70

ROPE WIRE (A)

Bartonville,Ill. K4	10.55
Buffalo W12	10.55
Fostoria,O. S1	10.55
Johnstown,Pa. B2	10.55
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.85
Portsmouth,O. P12	10.55
Roebling,N.J. R5	10.85
SparrowsPt. B2	10.65
Struthers,O. Y1	10.55
Worcester,Mass. J4	10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE

(Continued)

WIRE, Tire Bead

Bartonville,Ill. K4	....14.15
Monessen,Pa. P16	....14.20
Roebling,N.J. R5	....14.35

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	*....9.50*
Baltimore T6	....9.80
Boston T6	....9.80
Buffalo W12	*....9.50*
Cleveland A7	....9.50
Crawfordsville,Ind. M8	..9.00
Dover,O. G6	*....9.50*
Fostoria,O. S1	*....9.50*
FranklinPark,Ill. T6	..9.60
Kokomo,Ind. C16	....9.00
Massillon,O. R8	....9.00
Milwaukee C23	*....9.70*
Monessen,Pa. P16	....9.00
Pawtucket,R.I. N8	....9.80
Riverdale,Ill. A1	....9.10
Rome,N.Y. R6	....9.00
Trenton,N.J. R5	....9.80
Worcester A7, T6, W12	9.80

NAIL, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. (44) R2	152
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Chicago,Ill. W13	152
Cleveland A9	157
Crawfordsville,Ind. M8	154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Galveston,Tex. D7	157
Houston,Tex. S5	157
Jack'ville,Fla.(23) M8	162
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
KansasCity,Mo. S5	157
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
S.Chicago,Ill.(44) R2	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

NAILS, CUT (100 lb keg)

To Dealers (33)	
Conshohocken,Pa.	A3..$9.05
Wheeling,W.Va. W10	...9.05

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala.(44) R2	152
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Crawfordsville,Ind. M8	154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Jack'ville,Fla.(23) M8	162
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
S.Chicago,Ill.(44) R2	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	..$9.45
Bartonville,Ill. K4	....9.45
Buffalo W12	....9.35
Crawfordsville,Ind. M8	..9.45
Donora,Pa. A7	....9.35
Duluth,Minn. A7	....9.35
Jacksonville,Fla. M8	....9.88
Johnstown,Pa. B2	....9.35
Joliet,Ill. A7	....9.35
Kokomo,Ind. C16	....9.45
LosAngeles B3	....10.14
Minnequa,Colo. C10	....9.60
Pittsburg,Calif. C11	...10.13
S.Chicago,Ill. R2	....9.45
SparrowsPt.,Md. B2	....9.45
Sterling,Ill. N15	....9.35

Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	..$9.75
Bartonville,Ill. K4	....9.75
Buffalo W12	....9.65
Crawfordsville,Ind. M8	..9.75
Donora,Pa. A7	....9.65
Duluth,Minn. A7	....9.65
Jacksonville,Fla. M8	..10.18
Johnstown,Pa. B3	....9.65
Joliet,Ill. A7	....9.65
Kokomo,Ind. C16	....9.75
LosAngeles B3	....10.45
Minnequa,Colo. C10	...9.90
Pittsburg,Calif. C11	...10.45
S.Chicago,Ill. R2	....9.75
SparrowsPt.,Md. B2	....9.75
Sterling,Ill. N15	....9.65

Coil No. 6500 Interim	
AlabamaCity,Ala. R2	..$9.80
Bartonville,Ill. K4	....9.80
Buffalo W12	....9.70
Crawfordsville,Ind. M8	..9.80
Donora,Pa. A7	....9.70
Duluth,Minn. A7	....9.70
Jacksonville,Fla. M8	..10.23
Johnstown,Pa. B2	....9.70
Joliet,Ill. A7	....9.70
Kokomo,Ind. C16	....9.80
LosAngeles B3	....10.50
Minnequa,Colo. C10	....9.95
Pittsburg,Calif. C11	..10.50
S.Chicago,Ill. R2	....9.80
SparrowsPt.,Md. B2	....9.80
Sterling,Ill. N15	....9.70

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	..175**
Aliquippa,Pa. J5	....172‡
Atlanta A11	181
Bartonville,Ill. K4	181
Crawfordsville,Ind. M8	..181
Donora,Pa. A7	....175†
Duluth,Minn. A7	....175†
Fairfield,Ala. T2	....175†
Houston,Tex. S5	....180**
Jacksonville,Fla. M8	..186
Johnstown,Pa. B2	....179*
Joliet,Ill. A7	....175†
KansasCity,Mo. S5	....180**
Kokomo,Ind. C16	....177†
Minnequa,Colo. C10	....180**
Monessen,Pa. P7	....178††
Pittsburg,Calif. C11	..195†
Rankin,Pa. A7	....175†
S.Chicago,Ill. R2	....175**
S.SanFrancisco C10	..195**
SparrowsPoint,Md. B2	..181*
Sterling,Ill.(1) N15	..179††

WOVEN FENCE, 9-15 ga.

	Col.
Ala.City,Ala. R2	....162**
Ala.City, 17 ga. R2	....257**
Aliq'ppa,Pa.9-14½ga J5	165‡
Atlanta A11	168
Bartonville,Ill. K4	168
Crawfordsville,Ind. M8	..168
Donora,Pa. A7	....162†
Duluth,Minn. A7	....162†
Fairfield,Ala. T2	....162†
Houston,Tex. S5	....167**
Jacksonville,Fla. M8	..173
Johnstown,Pa.(43) B2	166
Joliet,Ill. A7	....162†
KansasCity,Mo. S5	....167**
Kokomo,Ind. C16	....164†
Minnequa,Colo. C10	..167**
Monessen,Pa. 9 ga. P17	166††
Pittsburg,Calif. C11	..185†
Rankin,Pa. A7	....162†
S.Chicago,Ill. R2	....162**
Sterling,Ill.(1) N15	....166††

WIRE (16 Gage)	An'ld Galv. Stone	Stone
Ala.City R2	...14.50	16.05**
Bartonville K4	...14.50	16.55
Buffalo W12	....14.50	....
Cleveland A7	....14.50	....
Crawf'dsville M8	14.60	16.55
Fostoria,O. S1	...14.60	16.15†
Jacksonville M8	..14.85	16.80
Johnstown B2	...14.50	16.40*
Kokomo C16	...14.60	16.15†
Minnequa C10	..14.75	16.45**
Palmer,Mass W12	14.50	16.05*
Pitts.,Calif. C11	14.85	16.40†
S.Chicago R2	..14.50	16.05**
SparrowsPt. B2	..14.60	16.50*
Sterling(1) N15	14.50	16.45††
Waukegan A7	...14.50	16.05†
Worcester A7	...14.80	....

WIRE, Merchant Quality (6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	..7.50	7.90**
Aliquippa J5	....7.40	7.925‡
Atlanta A11	.....7.50	8.10
Bartonville(48) K4	7.50	8.10
Buffalo W12	....7.40	8.80†
Cleveland A7	*....7.50*	....
Crawfordsville M8	7.50	8.10
Donora,Pa. A7	*...7.50*	*7.90†*
Duluth,Minn. A7	*...7.50*	*7.90†*
Fairfield T2	*....7.50*	*7.90†*
Houston(48) S5	..7.65	8.05**
Jacks'ville,Fla. M8	7.75	8.35
Johnstown B2(48)	7.40	7.975*
Joliet,Ill. A7	*....7.50*	*7.90†*
Kans.City(48) S5	7.65	8.05**
Kokomo C16	.....7.50	7.90†
LosAngeles B3	...8.35	8.925*
Minnequa C10	...7.65	8.05**
Monessen P7(48)	.7.40	8.00††
Palmer,Mass. W12	7.70	8.10†
Pitts.,Calif. C11	*..8.45*	*8.85†*
Portsmouth,O. P12	7.40	....
Rankin A7	*.....7.50*	*7.90†*
S.Chicago R2	....7.50	7.90**
S.SanFran. C10	..8.35	8.75**
Spar'wsP .B2(48)	7.50	8.075*
Str'ling(1)(48)N15	7.40	8.00††
Struthers,O.(48)Y1	7.40	7.90‡
Worcester,Mass. A7	*7.50*	*8.20†*

Based on zinc price of: *12.50c. †5c. §10c. ‡Less than 10c. ††13c. **Subject to zinc equalization extras.

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	175
Atlanta A11	175
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	..175
Donora,Pa. A7	*....175*
Duluth,Minn. A7	*....175*
Fairfield,Ala. T2	*....175*
Jacksonville,Fla. M8	180
Joliet,Ill. A7	*....175*
Houston S5	178
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Pitts.,Calif. C11	*....199*
S.Chicago R2	175
S.SanFran.,Calif. C10	..197
SparrowsPoint,Md. B2	..175
Sterling,Ill.(1) N15	173

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2, I-2	..157
Duluth,Minn. A7	157
Franklin,Pa. F5	157
Huntington,W.Va. W7	..157
Johnstown,Pa. B2	157
Marion,O. P11	157
Minnequa,Colo. C10	162
Moline,Ill. R2	162
S.Chicago,Ill. R2	157
Tonawanda,N.Y. B12	..157
Williamsport,Pa. S10	160

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts

Full-Size Body (cut thread)	
†½" x 6" and smaller	61
Larger than ½" diam. and all diams. longer than 6"	55
Under-Size Body (rolled thread; not nutted):	
½" x 6" and smaller.	61

†½" x 4" and smaller and shorter are not nutted.

Carriage, Machine & Lag Bolts, Hot Galvanized:

½" and smaller	42
Larger than ½" diam. and all diams. longer than 6"	32

Lag Bolts

All diams. & 6" and shorter	61
All diams. longer than 6"	55

Plow, Tap & Blank Bolts

½" x 6" and smaller.	61
Larger than ½" diam. and all diams. longer than 6"	55

Ribbed Neck, Carriage, Step, Elevator, Fitting-up and Tire Bolts:

All sizes	61

STOVE BOLTS, SLOTTED (nuts not attached; bulk)

¼" to ½" diam. incl., 3" or shorter;	
25,000 to 199,999 pieces	61
200,000 or more pieces	64
⅛" to ⅜" diam. incl., 3" or shorter:	
15,000 to 99,999 pieces	61
100,000 or more pieces	64
Longer than 3", any diam.:	
5000 to 99,999 pieces	61
100,000 or more pieces	64

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger 9.95
⅛-in. under..List less 32%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D.	B.W.	Seamless		Elec. Weld
In.	Gage	H.R.	C.D.	H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1¾	13	27.54	32.57	26.71
2	13	30.87	36.51	29.93
2¼	13	34.77	41.12	33.72
2½	12	37.73	44.63	36.60
2½	12	41.57	49.16	40.31
2¾	12	45.00	53.22	43.65
3	12	47.99	56.76	46.55

RAILWAY MATERIALS

	Standard		Tee Rails	
			All	60 lb
RAILS	No. 1	No. 2	No. 2	Under
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	4.625	4.675	....
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	....
Johnstown,Pa. B2	....	....	...(16)	5.65
Lackawanna,N.Y. B2	4.725	4.625	...(16)	5.65
Minnequa,Colo. C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	....
Williamsport,Pa. S19	....	....	....	5.65

TIE PLATES

Fairfield,Ala. T2	....5.625
Gary,Ind. U5	....5.625
Ind.Harbor,Ind. I-2	...5.625
Lackawanna,N.Y. B2	..5.625
Minnequa,Colo. C10	...5.625
Seattle B3	....5.775
Steelton,Pa. B2	....5.625
Torrance,Calif. C11	...5.775

TRACK BOLTS, Untreated

Cleveland R2	....12.15
KansasCity,Mo. S5	...12.90*
Lebanon,Pa. B2	....12.15
Minnequa,Colo. C10	...12.15
Pittsburgh O3, P14	...12.15
Seattle B3	....12.65

*Treated

AXLES

Ind.Harbor,Ind. S13	...7.50
Johnstown,Pa. B2	....7.50

JOINT BARS

Bessemer,Pa. U5	.....5.825
Fairfield,Ala. T2	.....5.825
Ind.Harbor,Ind. I-2	...5.825
Joliet,Ill. U5	.....5.825
Lackawanna,N.Y. B2	..5.825
Minnequa,Colo. C10	...5.825
Steelton,Pa. B2	.....5.825

SCREW SPIKES

Cleveland R2	....11.90
Pittsburgh O3	....11.90

STANDARD TRACK SPIKES

Fairfield,Ala. T2	.....7.90
Ind.Harbor,Ind. I-2, Y1	7.90
KansasCity,Mo. S5	....7.90
Lebanon,Pa. B2	.....7.90
Minnequa,Colo. C10	....7.90
Pittsburgh J5	.....7.90
Seattle B3	.....8.40
S.Chicago,Ill. R2	.....8.05
Struthers,O. Y1	.....7.90
Youngstown R2	.....8.05

METAL POWDER

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge iron:	
98+% Fe, annealed.	9.25
Swedish, c.l.f., Camden, N. J., c.l. in bags..	9.50
Domestic, f.o.b., Johnstown, Pa., Riverton, N.J., Niagara Falls, N.Y., in bags	9.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+% Fe)	34.00
Unannealed (99+% Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)..	31.00
Carbonyl Iron:	
98.1-99.9%, 3 to 20 microns, depending on grade, $6.00-275.00, in standard 200-lb. containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500 lb. drum frght. allowed	
Carlots	34.50
Ton lots	36.50
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	39.75-55.00†
Bronze, 5000-lb lots	66.50-70.75†
Copper:	
Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.00
Nickel-Silver, 5000-lb lots	61.75-64.25†
Phosphor-Copper, 5000-lb lots	68.75
Silicon	47.50
Solder	7.00*
Stainless Steel, 302	99.00
Stainless Steel, 316	$1.32
Tin	14.50*
Zinc 5000-lb lots	19.25-33.00†
Tungsten	Dollars
Melting grade, 99%	
60 to 200 mesh:	
1000 lb and over	4.50
Less than 1000 lb	4.65
Chromium, electrolytic 99.8% Cr min. metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Plus 4c per 100 lb.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝-in.; 6.90c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 10c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(44) Plus 3c per 100 lb.
(48) 6-7 Ga.
(49) 3½-in. and smaller rounds; 7.95c over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Ambridge, Pa. N2	6.5	...	10.5	...	13	...	14.5	...	14.5	...	14	...	16.5	...
Lorain, O. N3	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Youngstown Y1	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Alton, Ill. L1	...	...	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Benwood, W. Va. W10	17.5	+13	9	+18.5	+0.75	+28.5	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Butler, Pa. F6	18	+12.5	9.5	+18	1.5	+26	...	...	...	...	...	...	...	...
Etna, Pa. N2	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Fairless, Pa. N3	...	...	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Fontana, Calif. K1	...	...	....	....	....	....	6	+13.25	9	+9.25	11.5	+5.75	14	+4
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	17.5	+1.75	20.5	2.25	23	5.75	25.5	7.5
Lorain, O. N3	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sharon, Pa. S4	18	+12.5	9.5	+18	1.5	+26	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sparrows Pt., Md. B2	16	+12.5	7.5	+18	+0.5	+25	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Youngstown R2, Y1	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Wheatland, Pa. W9	18	+12.5	9.5	+18	1.5	+26	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Alton, Ill. L1	25	7.5	25.5	8	27	8.75	27	8.75	....	...	....	...
Benwood, W. Va. W10	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Etna, Pa. N2	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Fairless, Pa. N3	25	7.5	25.5	8	27	8.75	27	8.75	17.5	+1.25	17.5	+1.25
Fontana, Calif. K1	14.5	+3	15	+2.5	16.5	+1.75	16.5	+1.75	7	+11.75	7	+11.75
Ind. Harbor, Ind. Y1	26	8.5	26.5	9	28	9.75	28	9.75	18.5	+0.25	18.5	+0.25
Lorain, O. N3	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sharon, Pa. M6	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sparrows Pt., Md. B2	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Youngstown R2, Y1	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Wheatland, Pa. W9	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	Seamless Tube Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	18.50	23.00	....	....	31.00	....	....	....	42.25	39.00
202	19.75	25.50	31.00	36.25	33.50	....	36.75	38.75	42.50	42.50
301	19.25	23.75	.....	36.75	32.00	36.00	38.00	....	44.25	41.00
302	20.50	26.25	32.00	37.25	34.50	36.25	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	36.25	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	39.00	41.00	....	....	....
304	21.75	27.50	33.75	39.00	37.25	38.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	43.25	45.25	48.00	52.25	52.25
305	23.25	30.25	....	39.50	40.25	38.25	40.25	43.50	50.25	50.25
308	23.50	30.50	38.50	44.25	41.25	43.25	45.50	49.75	52.00	52.00
309	31.00	39.75	46.75	53.50	53.50	52.00	54.75	58.25	67.00	67.00
310	37.25	48.00	62.25	72.25	68.50	69.75	73.50	75.25	78.75	78.75
314	....	....	....	....	....	69.75	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	57.75	60.75	64.00	68.25	68.25
316L	....	....	56.25	64.50	63.25	62.75	65.75	69.00	73.25	73.25
317	37.25	48.25	62.75	72.75	75.50	70.75	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	43.00	45.25	49.25	54.25	54.25
18-8CeTa	29.25	38.00	45.75	52.25	53.25	50.75	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	32.25	34.00	36.25	....	....
405	17.50	23.00	26.75	31.00	32.25	30.50	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	29.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	29.50	31.00	....	....	....
420	....	30.25	31.00	36.00	37.75	35.50	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	29.50	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	30.00	31.50	....	....	....
431	....	25.50	33.25	....	....	37.25	39.25	40.75	....	....
446	....	....	35.50	40.50	53.25	40.00	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co., Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Tool Steel

	Plates, Carbon Base, 10%	Plates, Carbon Base, 20%	Sheets, Carbon Base, 20%
302	....	....	30.50
304	30.30	36.05	32.50
304-L	32.30	37.95	....
310	41.30	47.00	....
316	35.50	41.40	47.00
316-L	40.00	46.10	....
316-CB	41.15	48.45	....
321	32.00	37.75	37.25
347	34.40	41.40	48.25
405	25.80	33.35	....
410	25.30	32.85	....
430	25.30	32.85	....
Inconel	49.45	65.45	....
Nickel	41.05	55.65	....
Nickel, Low Carbon	43.25	60.05	....
Monel	42.35	56.35	....
Copper*	....	....	46.00

	Strip, Carbon Base, Cold Rolled, 10%	Strip, Carbon Base, Cold Rolled, Both Sides
Copper*	32.75	41.25

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Clad Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5% Cr Hot Work	0.430-0.460
Extra Carbon	0.330	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.090
18.25	4.25	1	4.75	...	2.305-2.475
18	4	2	9	...	2.675-2.6775
18	4	2	....	...	1.765
18	4	1	....	...	1.600
13.75	3.75	2	5	...	2.245
13.5	4	3	....	...	1.865
9	3.5	..	....	...	1.180
6	4	2	....	5	1.105
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9 C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
AlabamaCity,Ala. R2	54.50	....	....	....
Birmingham R2	54.50	55.00‡	....	....
Birmingham U6	....	55.00‡	59.00	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	58.50	59.00	59.50	60.00
Tonawanda,N.Y. W12	*60.00*	*60.50*	*61.00*	*61.50*
N.Tonawanda,N.Y. T9	....	59.00	59.50	60.00
Boston, deld.	69.15	69.65	70.15	....
Rochester,N.Y. deld.	61.52	62.02	62.52	....
Syracuse,N.Y. deld.	62.62	63.12	63.62	....
Chicago District				
Chicago I-3	58.50	59.00	59.00	59.50
Gary,Ind. U5	58.50	....	59.00	....
S.Chicago R2	58.50	....	59.00	....
S.Chicago,Ill. Y1	58.50	59.00	59.00	59.50
S.Chicago,Ill. U5, W14	58.50	....	59.00	59.50
Milwaukee, deld.	60.80	61.30	61.30	61.80
Muskegon,Mich. deld.	....	65.68	65.68	....
Cleveland District				
Cleveland A7, R2	58.50	59.00	59.00	59.50
Akron,O., deld.	61.25	61.75	61.75	62.25
Lorain,O. N3	58.50	....	....	59.50
Mid-Atlantic District				
Bethlehem,Pa. B2	60.50	61.00	61.50	62.00
NewYork, deld.	....	65.01	65.51	....
Newark, deld.	63.70	64.20	64.70	65.20
Birdsboro,Pa. B10	*62.00*	*62.50*	*63.00*	*63.50*
Chester,Pa. P14	60.50	61.00	61.50	....
Philadelphia, deld.	62.26	62.76	63.26	....
Steelton,Pa. B2	60.50	61.00	61.50	62.00
Swedeland,Pa. A3	60.50	61.00	61.50	62.00
Philadelphia, deld.	62.26	62.76	63.26	63.76
Troy,N.Y. R2	60.50	61.00	61.50	62.00
Pittsburgh District				
NevilleIsland,Pa. P6	58.50	59.00	59.00	....
Pittsburgh (N&S sides), Aliquippa, deld.	....	60.37	60.37	60.87
McKeesRocks, deld.	....	60.04	60.04	60.54
Lawrenceville,Homestead, Wilmerding, Monaca, deld.	....	60.66	60.66	61.16
Verona,Trafford, deld.	60.69	61.19	61.19	61.69
Brackenridge, deld.	60.95	61.45	61.45	61.95
Bessemer,Pa. U5	58.50	....	59.00	59.50
Clairton,Rankin,S.Duquesne,Pa. U5.	58.50	....	....	....
McKeesport,Pa. N3	58.50	....	....	59.50
Midland,Pa. C18	58.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Hubbard,O. Y1	....	....	59.00	....
Sharpsville,Pa. S6	58.50	....	59.00	59.50
Youngstown Y1	....	....	59.00	59.50
Youngstown U5	58.50	....	....	59.50
Mansfield,O., deld.	63.40	....	63.90	64.40
Duluth I-3	58.50	59.00	59.00	59.50
Erie,Pa. I-3	58.50	59.09	59.00	59.50
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	66.00	66.50	....	....
Geneva,Utah C11	58.50	59.00	....	....
GraniteCity,Ill. G4	60.40	60.90	61.40	....
Ironton,Utah C11	58.50	59.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	*62.00*	*62.50*	*63.00*	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	58.50	59.00	59.00	59.50
Cincinnati, deld.	64.26	64.76	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$67.50
Buffalo H1	68.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$91.00
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2)	95.50
Keokuk, O.H. & Fdry, 12½ lb pigiets, 16% Si, frgt allowed K2	98.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	72.50
Steelton,Pa. B2 (Phos. 0.035% max)	66.50
Philadelphia, deld.	70.05
Troy,N.Y. R2 (Phos. 0.035% max)	66.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Pittsburgh P6 (Intermediate) (Phos. 0.036-0.075% max)	63.50

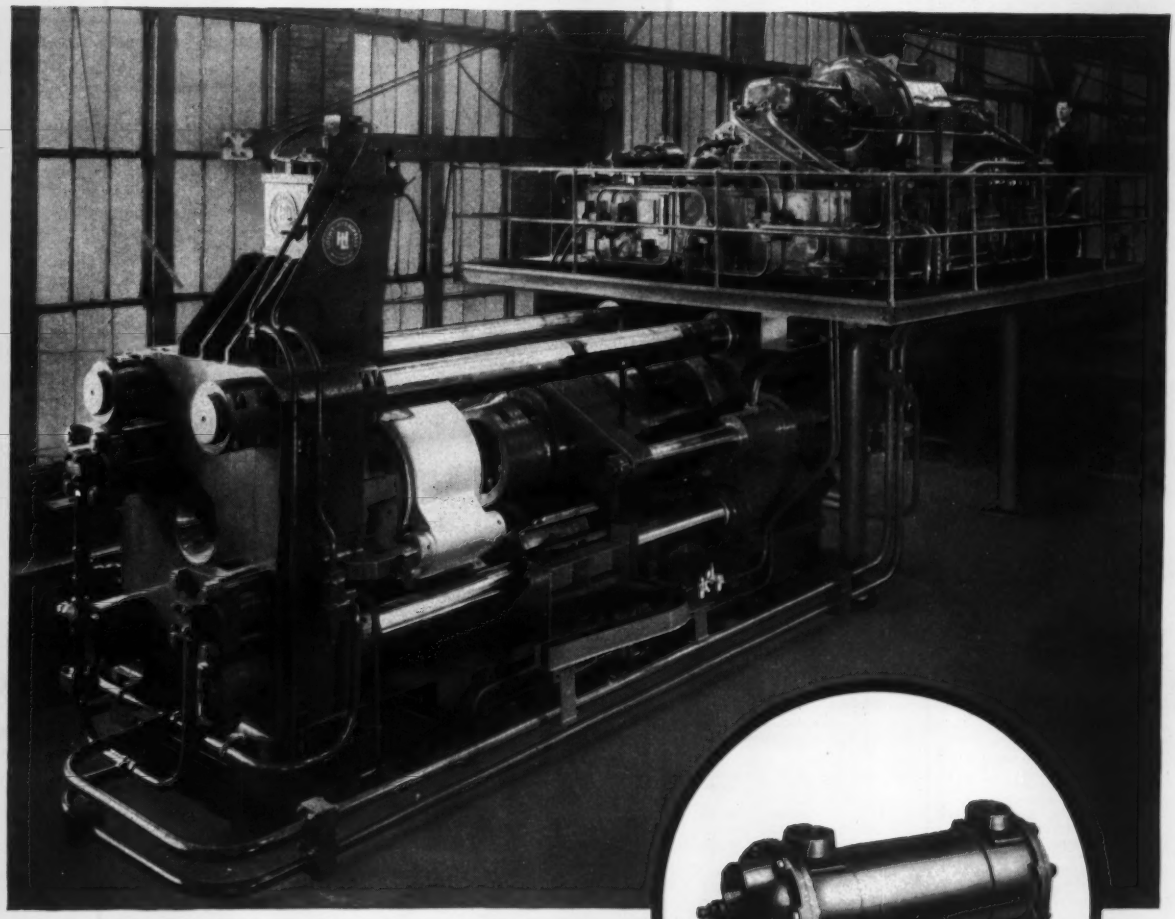
Warehouse Steel Products

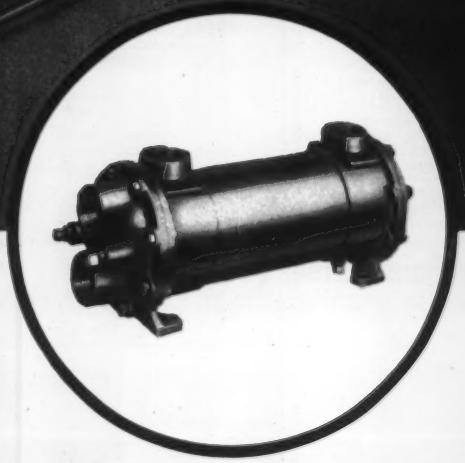
Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Mer-chant Qual.	H.R. Spec. Qual.	C.F. Rds.‡	H.R. Alloy 4140††§		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	7.42	...	9.39	....	7.63	7.49	9.48
Baltimore	7.21	8.32	8.50	....	7.91	7.53	..	8.62[3]	13.49	7.93	7.21	8.98
Birmingham	7.00	8.24	8.85	....	7.21	7.27	7.80	9.35	....	7.43	7.14	9.34
Boston	7.88	8.81	10.27	53.32	7.96	7.87	8.40	9.67	13.50	8.13	8.20	9.47
Buffalo	7.20	8.25	10.01	....	7.35	7.35	8.05	7.90	13.35	7.60	7.65	9.00
Chattanooga	7.28	8.44	8.60	....	7.36	7.42	7.95	9.18	....	7.43	7.45	9.32
Chicago	7.13	8.24	9.10	46.75	7.21	7.27	7.80	7.75	13.05	7.43	7.45	8.72
Cincinnati	7.25	8.23	9.10	46.10	7.45	7.51	8.04	8.15	13.29	7.90	7.74	8.97
Cleveland	7.13	8.24	8.95	49.16	7.31	7.33	7.86	8.00	13.11	7.76	7.62	8.89
Detroit	7.32	8.43	9.38	43.50	7.49	7.55	8.08	8.04	13.25	7.90	7.73	8.91
Erie, Pa.	7.08	8.24	8.95[10]	....	7.31	7.35	...	8.10[10]	....	7.65	7.30	8.79
Houston	7.85	8.75	10.49	....	8.15	8.25	...	9.85	14.00	8.20	7.80	9.20
Jackson, Miss.	7.44	8.50	9.20	....	7.42	7.57	8.10	9.44	....	7.73	7.75	9.39
Los Angeles	8.15	10.00	11.00	51.50	8.50	8.15	8.70	10.90	14.35	8.30	8.75	10.85
Milwaukee	7.22	8.33	9.19	....	7.30	7.36	7.89	7.94	13.14	7.60	7.54	8.81
Moline, Ill.	7.15	8.44	8.85	....	7.41	7.43	...	8.10	....	7.63	7.34	...
New York	7.74	8.84	9.59	47.57	8.17	8.11	8.66	9.72	13.43	8.09	8.17	9.46
Norfolk, Va.	7.25	...	...	....	7.65	7.65	...	9.50	....	7.95	7.45	8.95
Philadelphia	7.34	8.45	9.37	45.98	7.99	7.73	8.26	8.52	13.25	7.75	7.72	8.83**
Pittsburgh	7.13	8.24	9.40	49.00	7.21	7.27	7.80	8.00	13.05	7.43	7.45	8.72
Portland, Oreg.	7.80	8.80	10.65	....	8.00	7.95	...	12.20	15.00	7.85	7.75	9.60
Richmond, Va.	7.25	...	9.49	....	7.85	7.85	8.38	9.50	....	8.10	7.50	9.35
St. Louis	7.42	8.53	9.69	43.89	7.50	7.56	8.09	8.29	13.34	7.83	7.74	9.01
St. Paul	7.46	8.59	9.16	....	7.72	7.74	...	8.51	13.51	7.94	7.65	9.12
San Francisco	8.20	9.65	10.15	51.65	8.35	8.15	8.70	11.45	14.35[3]	8.25	8.30	10.50
Seattle	8.75	10.50	10.90	54.00	8.90	8.60	9.15	12.25	14.65	8.50	8.50	10.70
Spokane	8.65	11.00[7]	10.80	....	8.90	8.60	9.15	12.10	15.40	8.40	8.40	11.15
Washington	7.78	9.80	8.60	....	8.49	8.24	...	9.40	....	8.51	8.11	9.56

*Prices do not include gage extras; †prices include gage and coating extras (based on 13.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **¼-in. and heavier; ††as annealed; §§under ½-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [3]—500 to 9999 lb; [5]—400 to 999 lb; [4]—4000 lb and over; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—1500 to 3999 lb; [8]—2000 to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over; [10]—2000 lb and over.





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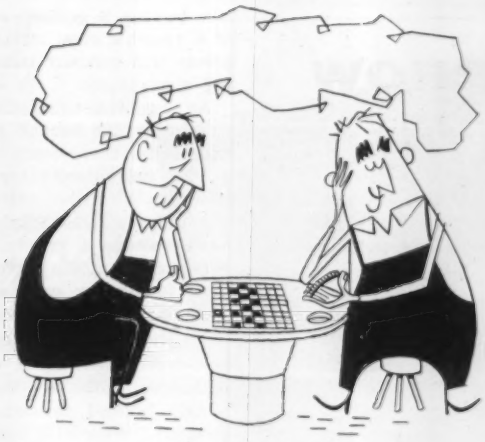

Checkerboard goes from fun to functional on . . .

Color-Coded Castings

IN A cost-conscious industry with tight profit margins, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., is trying something new: A group of ten color-coded casting alloys.

The company calls its series Checkerboard alloys because of the coding design cast into each product. Superior feels the alloys will help maintain its reputation for high quality.

Innovation—Color coding as such is not new. Bar steels, for example, have used this method for years. But Ross L. Gilmore, Superior's president and general manager, points out: "We believe this is the first time the system has ever been applied to alloy steel castings."

Many alloys are code numbered, but often they can't be read. When parts are stockpiled outdoors, rust scale and dirt make numbers hard to spot. If a manufacturer has the same part cast in different alloys, he may have to run expensive metallurgical tests to see what he has.

Superior casts a five-square checkerboard into each part. At final inspection time, the correct color is painted on. The nonfading color identifies the alloy. A code number or letter also can be stamped in the center square to provide a key to special heat treating characteristics or to indicate other analyses.

Introduction—Checkerboard alloys came on the market the first of this year. Customers have been sent pamphlets listing each alloy and giving general specifications.

Superior had two objectives in developing this series. One was to provide a means of easily identifying various alloys. The other was to offer a broad range of low alloy steels for casting.

Mr. Gilmore explains that each of the checkerboard series is close to standard SAE specifications, but he adds: "Our alloys are deoxidized with titanium to reduce nitrogen content. We don't use the aluminum-killed process."

The company also provides a fairly wide range of alloy material in each steel. For example, Checkerboard Gray is a nickel alloy which closely resembles the SAE 2300 series. However, it has a broad nickel content which ranges from 2.50 to 4 per cent. This content can be varied to customer specifications.

Selling — Although most castings are sold by the pound, Lloyd E. Young, sales manager, points out that Superior prefers to sell a quality product on a piece basis. The company also provides a complete technical service to help customers with casting problems, and it holds engineering clinics with customers. All this is aimed at better merchandising.

Mr. Young offers this example: "You can sell a 100-lb bag of sugar for possibly a 10-cent profit, but a can of anchovies may have a profit margin of 25 cents. We call our Checkerboard alloys 'fancy goods.' They aren't priced out of the market, but we believe a quality casting and our product service are worth a slight premium."

Agreement—Apparently Superior's customers think so, too. Although it's still too early to compile sales statistics, current orders indicate that manufacturers favor the color-coded alloys.

"Checkerboard White is one of the most popular," Mr. Gilmore reports. "This carbon-manganese alloy has excellent castability. It's good for medium-range temperatures and for pressure work up to 2000 psi."

He adds that the company plans to run 20 per cent of its 1956 casting production in the Checkerboard series. An increased sales volume of 15 per cent also is expected this year. It looks like quality-controlled, Checkerboard alloy steels have a profitable market potential in a pennies-per-pound industry.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 185 & 186

With the possible exception of the New England area, sheetmakers appear to be having little difficulty in disposing of all the tonnage turned out by their mills. In the East, for example, demand for both hot and cold-rolled sheets is increasing. In the Midwest, cold-rolled sheets are seen enjoying demand exceeding supply throughout the second quarter, even though automotive requirements do not pick up.

In New England the tonnage of flat-rolled offered by the mills is reported in excess of demand, with the possible exception of cold-rolled silicon strip which is sold out through the second quarter. Earlier tonnage allotments in the district are being supplemented by substantial additional tonnage on the part of an increasing number of producers. Some sellers are equalizing freight to around $4 a ton. Excess primes and wasters are available in the district for prompt shipment. This has been the case since mid-February, and what is disturbing to area traders is the fact that the heavier volume offered is not being taken up by manufacturers or distributors.

Inventories are up to a more satisfactory level in the case of more consumers, and there is a minimum of price hedge buying of stainless, carbon, galvanized and specialties. Orders are coming in at slower pace, and some shipments are being deferred to July and August by nonautomotive stampers. For the first time in months, it looks like a buyers' market prevails in New England.

Elsewhere, however, the market picture is decidedly brighter. Strong and rising demand is reported generally. Inquiry from manufacturers of household durables is expanding, and a favorable turn in automotive requirements is noted. Also, protec-

cost-savings

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MONTREAL, CANADA

tive buying is gaining as the threat of a possible steel strike and higher prices this summer take on increasing significance.

As a general thing, the sheet mills will enter the second quarter with substantial carry-overs in the major grades, galvanized excepted. Demand and supply in the latter are pretty much in balance. Bringing in of a new continuous galvanizing line by Jones & Laughlin Steel Corp. will tend to further ease supply conditions in galvanized sheets.

Pittsburgh mills report demand for cold-rolled sheet again is rising. Several area mills say they are completely booked through the second quarter. It's reported that mills which had extra tonnage to offer for March and April delivery will have nothing extra for May or June allotments. Also, a district fabricator of hot-rolled strip says deliveries are lengthening again as mill customers fear cutting inventories too far.

Currently, the market is steady pricewise, but a general increase is looked for around midyear. Last week, Washington Steel Corp. announced a reduction of $45 per ton on 430 stainless sheets, bringing the base price on this grade to 34.50 cents a pound. The new price became effective Mar. 27. It is thought the lower price will stimulate buying of the 430 grade in the face of the continued stringency in nickel-stainless.

Semifinished Steel . . .

Semifinished Prices, Page 184

Steel production at Youngstown Sheet & Tube Co.'s Campbell Works was cut last week by a wildcat strike of about 500 open-hearth workers. The district ingot rate dropped to about 90 per cent of capacity as a result. Eleven open hearths were idled. The dispute involved incentive pay rates. Also affected by the open hearth shutdown were blast furnaces, the coke plant and the blooming and billet mill.

Plates . . .

Plate Prices, Page 184

Platemakers continue to turn away tonnage business. The only reason all plate mills are not booked full for the entire second quarter is because some are opening books on a month-to-month basis in an effort to keep commitments under better control. Despite such efforts in the first quarter, none of the producers will wind up the period without fairly substantial carry-over business into second quarter.

Because of the lack of adequate supplies of plates and structurals, the Pennsylvania Railroad has cut

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back its car construction program at Altoona, Pa. Steel shipments are several months behind projected delivery dates at that point. The shops may have to close down until June, by which time it is thought sufficient steel will have been accumulated to permit the program to go ahead.

Construction firms are experiencing more difficulty buying plates from warehouses, the latter's stocks having become badly depleted and unbalanced in recent months. Gray market sellers are reported getting premium prices for plates in the Buffalo area.

While not all the platemakers have opened their books for the entire second quarter, there is more than enough tonnage before the market to absorb mill capacity. There is no letup in demand from any consuming area. Generally, plate mills expect a record tonnage year.

A little more strip-plate is being produced, primarily to help out the railroads. Some mills stepped up strip-plate production when the auto industry eased pressure for sheets and strip some weeks back. The switch to plate production was motivated chiefly by the steelmakers' desire to help out the carbuilders, not for fear of being unable to dispose of available sheet tonnage.

Sun Pipe Line Co., Philadelphia, has awarded major contracts for the construction of a $5-million, 14-in. petroleum products pipeline from Twin Oaks, Pa., to Newark, N. J. Work of laying the 109-mile line begins in May.

Bethlehem Steel and U. S. Steel have booked 9000 tons of sheet piling required for the Rocky Reach dam on the Columbia river.

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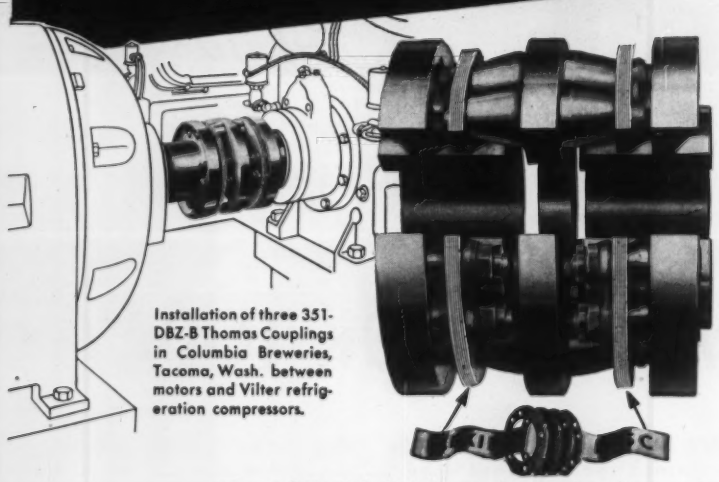

Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

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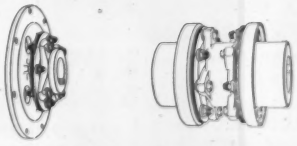
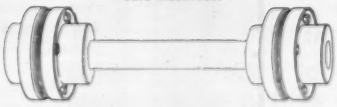
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



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Wire . . .

Wire Prices, Pages 186 & 187

Effective Mar. 12, U. S. Steel Corp. divisions, American Steel & Wire and Tennessee Coal & Iron, raised prices of merchant quality wire and bale ties following action by Republic Steel Corp. The increase amounted to about $2 per ton. Several wiremakers also announced increases on cold-rolled flat wire amounting to about $10 a ton.

Steel Bars . . .

Bar Prices, Page 184

Cutbacks in farm machinery production are taking the pressure off hot-rolled steel bars in the Chicago market. Lagging sales leave equipment inventories of some manufacturers high, with the result they have curtailed operations.

Bar demands have declined as a result. Still, mills anticipate capacity operations in the second quarter, with consumers taking all the tonnage offered them—some of it, in all probability, is going into inventory.

Some consumers in the East recently have been offered more bar tonnage for the second quarter than they anticipated. The total has not been large, and it appears to be only in selected instances that any excess has been offered. In general, the supply situation is tight, with indications that producers will have all the tonnage they can handle throughout the remainder of the first half.

Currently, demand for alloy bars on automotive account is much better than it was two or three weeks back.

"There's no doubt that buyers of hot-rolled bars are building stocks—buying bars in the second quarter which normally would be ordered in the third quarter," says the sales manager for one large bar mill. The producer's second quarter order books are filling rapidly, with customers anticipating a price increase around midyear.

While auto builders' orders for bars

dipped in March, suppliers report they are snapping back. A mill in the Pittsburgh area reports the only opening in its second quarter books is in hot-rolled rounds for June shipment.

Ferroalloys . . .

Ferroalloy Prices, Page 199

Higher costs for manganese ore and increased freight rates make necessary upward revision in prices on a number of manganese alloys, the Electro Metallurgical Co., division of Union Carbide & Carbon Corp., announced. The new prices, effective Mar. 14 on a spot basis and Apr. 1 on contracts, amount to a weighted average increase of 3.6 per cent.

Products affected are: Low-carbon ferromanganese (low-phosphorus), 34 cents, up 3 per cent; low-carbon ferromanganese (0.07% C), 31.95 cents, up 3.2 per cent; standard ferromanganese, 10.75 cents, up 4.9 per cent; medium-carbon ferromanganese, 22.85 cents, up 2.2 per cent; silicomanganese (1.50% C), 12 cents, up 4.3 per cent; Mansiloy alloy, 21 cents, up 2.4 per cent; ferromanganese briquettes, 13 cents, up 4 per cent; silicomanganese briquettes, 13.55 cents, up 3 per cent; electrolytic manganese metal, 31.50 cents, up 5 per cent.

All the increases are across the board, there being no change in quantity, sizing, packing or spot differentials, and the prices quoted are for carload lots of lump material in bulk.

Structural Shapes . . .

Structural Shape Prices, Page 184

Heavy order backlogs are supporting active fabricating shop operations. However, structural awards currently are light. This is a temporary condition since much work is before the market and will be acted upon as the building season opens up.

Meanwhile, fabricators are operating at a rate as high as their steel supplies permit. They anticipate sustained demand over coming months. In the Philadelphia area, the larger shops are booked ahead 12 and 14 months, and some of the medium-sized shops in the area average 10 to 12 months. Most of the district's smaller fabricators are booked several months ahead.

Backlogs of fabricators in the New York area again are reported becoming more extended following a leveling off period. This is said to be particularly noticeable among the smaller and medium-sized shops, notably those that can offer better deliveries than the larger fabricators.

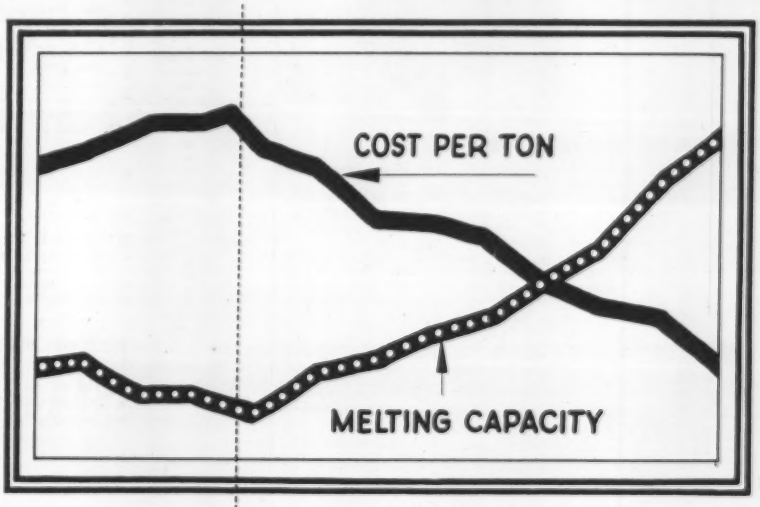
Electric power plant expansions are increasing the loads on the fabricators. Tonnage for buildings and equipment will equal and probably surpass that of last year. Currently being estimated are 1500 tons for tunnel diversion gates for the St. Lawrence Seaway project.

In New England, bridge contracts continue heavy, although scores of beam and stringer spans, mainly flood loss replacements, are going prestressed concrete.

The heavy volume of commercial construction under way and in prospect for this year is creating a much stronger demand for structural steel in this quarter than has been the case in other years. With the usual spring surge in demand, structurals will be even harder to get next quarter. Heavier sections are in tightest supply. Special sizes present a particularly acute problem, since these are not stocked by warehouses.

Not in months has so much structural tonnage been pending in the Pacific Northwest. Current placements are small, however. Fabrica-

A Great Picture By GLOBE Ladle Brick



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combination ac-dc
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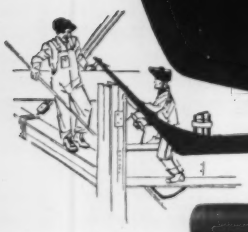

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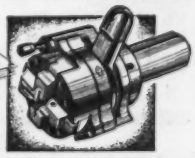

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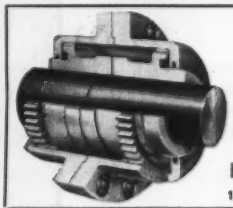

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order from the smallest to the largest

Excellent facilities for export shipment

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GALVANIZING COMPANY
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tors expect major awards over the next 30 days.

Chicago is taking bids Apr. 3 and 6 on the first sections of the bridge which is the key structure in the $85-million Calumet skyway. The two sections will require over 11,000 tons of structural steel. The bridge will be 1300 ft long, with a 650-ft central span.

Fabricators in the Chicago area are well booked for the year and are forced to limit their operations to steel availability.

Rails, Cars . . .

Track Material Prices, Page 187

Freight car buying in February showed a further decline, involving only 1675 units against 1818 in the preceding month, reports the American Railway Car Institute and the Association of American Railroads. In February, 1955, orders totaled 2690 cars.

Freight car deliveries continue to rise, however. In February they totaled 4881 units, compared with 4199 in January and 2422 in February a year ago.

Backlogs as of Mar. 1 involved 141,427 cars. This compares with 144,946 on Feb. 1 and 18,663 on Mar. 1, 1955.

Pig Iron . . .

Pig Iron Prices, Page 189

Merchant pig iron sellers anticipate that March business will be the best since October or November in the East despite the severe snow storms of the last week which cut production at some district foundries.

Consumers hold substantial iron inventories, but they are seeking to increase their stocks as a hedge against possible price increases in the next few months. Some buyers expect prices to go up before the wage settlement at midyear because of the recent increase in freight rates, and higher prices on ore and other raw materals.

Sellers in the Midwest are shipping in satisfactory volume, and prospects for the next couple of months are bright. A pickup in automotive foundry activity is not expected until car sales trends can be charted, however. And there is growing concern expressed in the area over cutbacks in farm machinery production.

Barring temporary disruptions due to adverse weather, pig iron consumers in the Philadelphia area are expected to continue operating at high level through first half. District foundries are not operating at capacity, however, gray iron and steel shops being estimated at above 80 per cent engaged and malleable shops a little higher. In the Los Angeles

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.00
Mesabi nonbessemer	10.85
Open-hearth lump	12.10
High phos.	10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)	nom. 18.00-20.00
Brazilian iron ore, 68-69% (spot)	26.00-28.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$34.00-$34.50
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, $1.06-$1.11 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, 95c-$1.00.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1	nom. $45.00-$50.00
48% 3:1	42.00-44.00
48% no ratio	34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	33.00-35.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.10

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.60-$3.85
60-65%	3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills	
Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Pa., New Savage, Md., St. Louis, $150.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Windham, Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawstone, Pa., Warren, Windham, O., Leslie, Md., Athens, Tex., $145; Morrisville, Pa., Niles, O., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa., $248.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Reesdale, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $258.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ⅛-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅝-in. grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens	
Connellsville, furnace	$13.75-14.50
Connellsville, foundry	16.00-17.00
Oven Foundry Coke	
Birmingham, ovens	$25.65
Cincinnati, deld.	30.58
Buffalo, ovens	27.50
Buffalo, deld.	28.75
Camden, N. J., ovens	26.50
Chicago, ovens	27.00
Chicago, deld.	28.50
Detroit, ovens	27.50
Detroit, deld.	28.50
Pontiac, deld.	29.06
Saginaw, deld.	30.58
Erie, Pa., ovens	27.50
Everett, Mass., ovens	
New England, deld.	*28.55
Indianapolis, ovens	26.75
Ironton, O., ovens	26.00
Cincinnati, deld.	28.59
Kearny, N. J., ovens	26.75
Lone Star, Tex., ovens	19.50
Milwaukee, ovens	27.50
Neville Island, (Pittsburgh) Pa., ovens	26.25
Painesville, O., ovens	27.50
Cleveland, deld.	29.43
Philadelphia, ovens	26.50
St. Louis, ovens	28.50
St. Paul, ovens	26.50
Swedeland, Pa., ovens	26.50
Terre Haute, Ind., ovens	26.75

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00
Per ton, bulk, ovens	
Ammonium sulphate	$42-$45
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 1525.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-$39; 70%, $35-$36; 60%, $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plant

Diam (Inches)	Length	Per 100 lb
GRAPHITE		
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25
CARBON		
8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

area, foundry melting rates have been increased to 100 per cent of capacity.

Iron Ore . . .

Iron Ore Prices, Page 197

Consumption of Lake Superior iron ore in February totaled 7,440,-152 gross tons, reports the Lake Superior Iron Ore Association. This was down from the 7,952,689 tons consumed in January, but was up sharply from the 6,446,914 tons used in February, 1955.

In the first two months of this year consumption amounted to 15,-292,841 gross tons. This compares with 13,066,734 in the like period of last year.

Stocks of ore on Lake Erie docks and at furnaces on Mar. 1 amounted to 29,172,702 gross tons. This was down from the 36,701,847 tons held on Feb. 1, and compared with 31,-108,479 tons held on Mar. 1 a year ago.

Tubular Goods . . .

Tubular Goods Prices, Page 188

Pipe producers expect an even flow of demand throughout the second quarter. They say users have anticipated their needs of such items as mechanical tubing, sales of which have been strong for some months in advance of the opening of the construction season.

While oil country goods buyers may be building stocks in anticipation of a price increase this summer, they are spacing their orders so that they fall into mill schedules throughout the first half. In this way, a sudden avalanche of tonnage on the pipe mills is avoided.

The pipe jobbers have been having trouble building stocks of mechanical tubing. Customers have been taking tonnage almost as rapidly as it is received from the mills.

Warehouse . . .

Warehouse Prices, Page 189

Despite the slackening in automotive requirements, warehouses are being pressed for tonnage, especially for those products that are particularly scarce at the mill level—plates and structurals. In general, distributors' stocks are unbalanced, though supplies of some items, such as hot-rolled and cold-rolled bars, appear somewhat better than was the case some time back.

The warehouses in the Midwest are enjoying good demand despite the reduced operations in the automotive and farm implement industries. At Chicago, demand is reported heaviest in cold-rolled sheets, wide hot-rolled sheets, plates and structurals. In improved supply there are hot-rolled and cold-drawn bars as well as nickel-free stainless and alloys generally.

One Pittsburgh area distributor has warned customers that a price increase of $10 per ton is likely in most products after July 1. With reports of such impending increases freely circulating in the district, users are inclined to order their future needs earlier than usual. This stepped-up demand is being reflected in shrinking warehouse stocks. Shortages of certain items are preventing the district warehouses from racking up new sales records.

Most sheet items, of course, are in freer supply than they were earlier in the year. However, cold-rolled sheets will be harder to get in the second quarter. Galvanized sheets have been in steadily improving supply for some time, and the bringing in of a new continuous galvanizing line by Jones & Laughlin will contribute to further easing of supply.

Distributors' price schedules were adjusted recently in the Pacific Northwest, the new schedules going into effect Mar. 20. The higher prices offset increased freight rates. Revisions in warehouse schedules also were effected last week in Philadelphia and Washington.

STAMPINGS or CASTINGS?

here's your answer

Indiana Pressed Steel engineers will gladly advise in the redesign of your products to use stampings in place of castings. Indiana Pressed Steel stampings can reduce your costs, save on product weight, assure improved finish, and eliminate machining and finishing costs. Stampings are uniform and dependable.

There is no obligation in asking us to survey your individual problem . . . Phone today, or send us a sample or specifications of one or more parts that you would like to consider changing to stampings. You'll hear from us promptly.

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Functionally Correct!

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Write for New Catalog No. 150

NICE BALL BEARING CO.

NICETOWN • PHILADELPHIA • PENNSYLVANIA

Current Ferroalloy Quotations

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $94; 19-21% Mn, 1-3% Si, $91.50; 16-19% Mn, $89.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $205. Duquesne, Johnstown, Sheridan, Pa.; Philo, O.; Tacoma, Wash.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $213 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 30.95c per lb of contained Mn, carload packed 32c, ton lots 33.5c, less ton 34.7c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 22.35c per lb of contained Mn, packed, carload 23.4c, ton lot 25c, less ton 26.2c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 30c; 2000 lb to min carload, 32c; 250 lb to 1999 lb, 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.5c per lb of alloy. Packed, c.l. 12.5c, ton 12.95c, less ton 13.95c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 31.75c per lb contained Cr, 0.02% max 38.50c, 0.03% max 38c, 0.06% max 36.50c, 0.1% max 36c, 0.15% max 35.75c, 0.2% max 35.50c, 0.5% max 35.25c, 1.0% max 34c, 1.5% max 33.85c, 2.0% max 33.75c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 2 in. x D, bulk 27.4c per lb contained Cr. Packed, c.l. 28.7c, ton 30.5c, less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2 max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.29. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.75c per lb of contained Si. Packed, c.l. 14.85c, ton lot 16.3c, less ton 17.95c. F.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lots, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed, c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe, 0.07 max Ca). C.l. lump, bulk, 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lots packed 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 22c per lb of alloy, carload packed 23.05c, ton lot 24.95c, less ton 25.95c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 21.5c per lb of alloy, carload packed 22.95c, ton lot 25.25c, less ton 26.75c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing 2 lb of Cr). Contract, carload, bulk, 16.95c per lb of briquet, carload packed in box pallets 17.15c, in bags 17.85c; 3000 lb to c.l. in box pallets 18.35c; 2000 lb to c.l. in bags, 19.05c; less than 2000 lb in bags 19.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing 2 lb of Mn). Contract, carload, bulk 12.5c per lb of briquet, c.l. packed, pallets 12.7c, bags 13.5c; 3000 lb to c.l., pallets 13.9c; 2000 lb to c.l., bags, 14.7c, less ton 15.6c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 13.15c per lb of briquet, c.l. packed, pallets, 13.35c; bags 14.15c, 3000 lb to c.l., pallets, 14.55c; 2000 lb to c.l., bags, 15.35c; less ton 16.25c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.15c per lb of briquet; packed, pallets, 7.35c; bags, 8.15c; 3000 lb to c.l., pallets, 8.95c; 2000 lb to c.l. bags 9.75c; less ton 10.65c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.5c; bags 8.30c; 3000 lb to c.l. pallets 9.1c; 2000 lb to c.l. bags 9.9c; less ton 10.8c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.33 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.45 per lb of contained W; 2000 lb W to 5000 lb W, $3.55; less than 2000 lb W, $3.67. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min C 0.30% max). Ton lots, 2" x D, $4.65 per lb of contained Cb plus Ta, delivered; less ton lots $4.70.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ⅛ in. x 12 M, 18.5c per lb of alloy, ton lots 19.65c, less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb of alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 200 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base; carload, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.54 in all sizes except powdered which is $1.66; Washington, Pa., furnace, any quantity $1.46.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa.; $1.31 in cans; in bags, $1.30, f.o.b. Langeloth, Pa.; $1.24, Washington, Pa.

GREAT MOMENTS IN THE HISTORY OF IRON AND STEEL MAKING

Robert F. Mushet

Mushet conducting an early experiment with spiegeleisen. *. . . This is the thirteenth in a series of outstanding developments that have contributed to the progress of the iron and steel industry.*

1856
Spiegeleisen
"Looking-glass Iron"

Because Robert Mushet was quick to recognize the properties of Spiegeleisen in 1848 – then known as "looking glass iron" because of its brightness – he was able not only to raise the production of iron and steel but improve the quality as well. His early experiments are credited with helping both the Bessemer and Kelly processes in the making of steel. He did it by adding Spiegeleisen, a compound of iron, carbon and manganese to the metal after it had been subjected to an air blast. The Spiegeleisen deoxidized the metal and restored the small amount of carbon and manganese necessary to give steel the chemical composition desired.

Chemical composition plays a vital role in the field of scrap, too. Today, the finest grades of pig iron and the most selective grades of scrap produce America's finest grades of steel. These special steels require scrap of known analysis – a problem we are more than qualified to solve because of our experience, personnel, equipment and the strategic location of our offices. We would like to put our facilities to work for you.

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Scrap . . .

Scrap Prices, Page 202

Consumption of ferrous materials (scrap and pig iron) in January increased 2 per cent over that the preceding month to establish a new record high, reports the U. S. Bureau of Mines. Total melt was 12,959,000 gross tons, of which 51.6 per cent (6,685,000 tons) was scrap, and 48.4 per cent (6,274,000 tons) was pig iron.

Stocks of ferrous scrap held by consumers at the end of January totaled 6,397,000 gross tons. This was slightly down from the preceding month. Stocks of pig iron, 2,031,000 tons, also were off slightly.

Pittsburgh—The market is stronger. Brokers bid $50 for No. 1 heavy melting scrap while the most recent mill buy was at $48. Some brokers are reported to have bid as high as $51 for No. 1 heavy melting. Cast iron grades are more active.

Cleveland — Steelmaking scrap prices are quoted $1.50 to $2 per ton higher here, reflecting sentimental strength stemming from substantial purchases at sharply higher prices in the Valley last week. One large purchase of production scrap at $59 was reported there.

Philadelphia—A strong undertone prevails in the scrap market here. On the major open-hearth grades, brokers are paying as much or more in covering on old contracts as they are receiving. While there is little new consumer buying of these grades, indications are consumers will have to pay higher prices once sizable trading is resumed.

Cast iron grades also are buoyant, with heavy breakable cast holding at $53, delivered, and drop broken machinery, $55.

Chicago—Scrap prices are rising again. Two important grades, including No. 1 heavy melting steel and No. 1 factory bundles, are up $1 a ton on the basis of mill buying. There are indications that consumers are unable to obtain other grades at current prices. To fill existing orders, brokers are paying dealers about $2 a ton more than they did a week ago, creating a bullish situation.

Boston — Steel scrap prices are slightly firmer, except for the secondary grades. New buying is light, with shipments tied up most of last week because of heavy snow and generally adverse weather. Freight rate to eastern Pennsylvania, 40-ton carlots, including 3-per-cent excise tax, now is $9.11; to the Pittsburgh district, $11.75. Rates were $9.59 and $11.08, respectively.

New York—Following the price increase a week ago, brokers' buying prices are unchanged, but strong. Adverse weather has disturbed the rather delicate balance between supply and demand for steel scrap needed to cover old consumer contracts. Once consumers cover on any sizable amount of new tonnage, still higher prices may develop in the brokers' market here.

Detroit — Scrap prices are unchanged, and the market undertone is firm. While the last sale of No. 1 heavy melting to a local consumer was at $48, Buffalo dealers say they can ship material into the Youngstown district at $49-$50.

Cincinnati — An upturn in scrap prices is under way here, with No. 1 grades up $3.50 to $49-$50. Steel mills are experiencing a little more difficulty in covering their requirements. The big automobile plants have cut back production schedules. As a result, less auto scrap is flowing to market.

Detroit—Scrap steel prices are unchanged. A little activity is expected toward the end of the month. The market undertone is firm, pending the closing of month-end auto lists.

St. Louis—The scrap market is firm but is inching up, especially rail prices. No. 1 railroad heavy melt, small length and random length rails show an increase — small rails as much as $3. In the cast iron grades, stove plate is up $1.

Birmingham—The scrap market continues weak. Some material is moving north by both rail and barge. The district's largest consumer was back in the market last week for limited tonnages at lower prices. Due to the strike at plants of U. S. Pipe & Foundry Co., resulting in greatly curtailed production of cast pipe, cast iron scrap is reported in more plentiful supply. Prices hold unchanged. The export market continues firm.

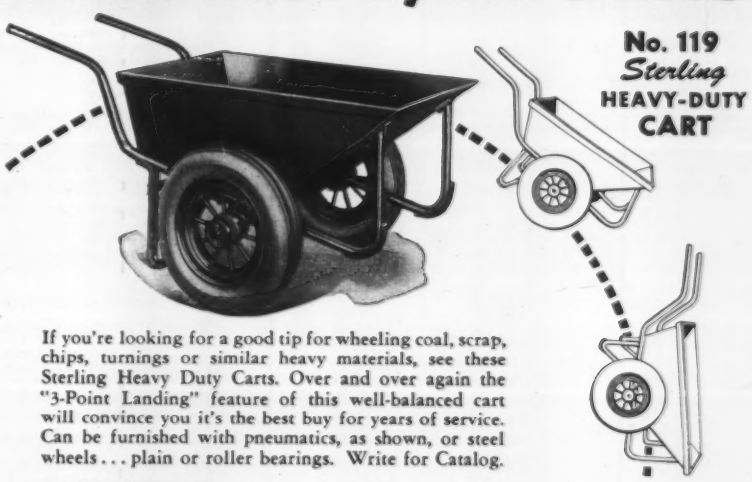
Los Angeles—Offshore scrap reportedly is being shipped into this area by way of San Francisco. Little foreign material is entering the Los Angeles area directly.

San Francisco—Demand for steel scrap is keeping pace with incoming shipments, with steelmaking operations in the district holding close to 100 per cent of capacity.

Seattle—Scrap is steady on the basis of $38 and $35 for No. 1 and No. 2 heavy melting, respectively. Some adjustments are thought likely. Larger buyers are holding out of the market, and mill inventories are high. Foreign purchasers are not actively buying. Japan bought heavy tonnage some months back,

(*Please turn to page* 204)

YOUR BEST *Tip* IN CARTS



No. 119 *Sterling* HEAVY-DUTY CART

If you're looking for a good tip for wheeling coal, scrap, chips, turnings or similar heavy materials, see these Sterling Heavy Duty Carts. Over and over again the "3-Point Landing" feature of this well-balanced cart will convince you it's the best buy for years of service. Can be furnished with pneumatics, as shown, or steel wheels . . . plain or roller bearings. Write for Catalog.

3 SIZES AVAILABLE:

No. 119 ..... 7½ cu. ft.
No. 120 ..... 9 cu. ft.
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A HALF CENTURY OF PROGRESS

Sterling WHEELBARROWS

Look for this Mark of STERLING Quality

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 21	$49.83
Mar. 14	49.17
Feb. Avg.	48.96
Mar. 1955	37.50
Mar. 1951	44.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania

PITTSBURGH

No. 1 heavy melting	*48.00-50.00*
No. 2 heavy melting	*44.00-46.00*
No. 1 bundles	*48.00-50.00*
No. 2 bundles	*40.00-42.00*
No. 1 busheling	*48.00-50.00*
Machine shop turnings	*34.00-35.00*
Mixed borings, turnings	*34.00-35.00*
Short shovel turnings	*37.00-38.00*
Cast iron borings	*37.00-38.00*
Cut structurals, 3 ft lengths	57.00-58.00
Heavy turnings	44.00-45.00
Punching & plate scrap	57.00-58.00
Electric furnace bundles	52.00-53.00

Cast Iron Grades

No. 1 cupola	*50.00-51.00*
Charging box cast	*46.00-47.00*
Heavy breakable cast	*46.00-47.00*
Unstripped motor blocks	*33.00-34.00*
No. 1 machinery cast	*55.00-56.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*57.50-58.50*
Rails, 2 ft and under	*68.00-69.00*
Rails, 18 in. and under	*69.00-70.00*
Rails, random lengths	63.00-64.00
Railroad specialties	61.00-62.00

Stainless Steel Scrap

18-8 bundles & solids	330.00-340.00
18-8 turnings	225.00-235.00
430 bundles & solids	110.00-120.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	*52.00-53.00*
No. 2 heavy melting	*46.00-47.00*
No. 1 bundles	*52.00-53.00*
No. 2 bundles	*39.00-40.00*
No. 1 busheling	*52.00-53.00*
Machine shop turnings	29.00-30.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	33.00-34.00
Cast iron borings	33.00-34.00
Low phos.	56.00-57.00
Cut structural plates 2 ft and under	*57.00-58.00*
Alloy free, short shovel turnings	37.00-38.00
Electric furnace bundles	*52.00-53.00*

Cast Iron Grades

No. 1 cupola	54.00-55.00
Charging box cast	47.00-48.00
Stove plate	52.00-53.00
Heavy breakable cast	46.00-47.00
Unstripped motor blocks	30.00-32.00
Brake shoes	41.00-42.00
Clean auto cast	54.00-55.00
Burnt cast	41.00-42.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	*54.00-55.00*
R.R. malleable	*60.00-61.00*
Rails, 2 ft and under	*70.00-71.00*
Rails, 18 in. and under	*71.00-72.00*
Rails, random lengths	*66.00-67.00*
Cast steel	59.00-60.00
Railroad specialties	59.00-60.00
Uncut tires	60.00-61.00
Angles, splice bars	65.00-66.00
Rails, rerolling	68.00-69.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*345.00-355.00*
18-8 turnings	*205.00-215.00*
430 clips, bundles, solids	105.00-115.00
430 turnings	55.00-65.00

YOUNGSTOWN

No. 1 heavy melting	*55.00-56.00*
No. 2 heavy melting	*42.00-43.00*
No. 1 bundles	*55.00-56.00*
No. 2 bundles	*39.00-40.00*
No. 1 busheling	*55.00-56.00*
Machine shop turnings	29.00-30.00
Short shovel turnings	34.00-35.00
Cast iron borings	34.00-35.00
Low phos.	*57.00-58.00*
Electric furnace bundles	*55.00-56.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*56.00-57.00*

CHICAGO

No. 1 heavy melting	*48.00-51.00*
No. 2 heavy melting	39.00-40.00
No. 1 factory bundles	*52.00-53.00*
No. 1 dealer bundles	48.00-49.00
No. 2 bundles	36.00-37.00
No. 1 busheling	48.00-50.00
Machine shop turnings	27.00-28.00
Mixed boring, turnings	29.00-30.00
Short shovel turnings	29.00-30.00
Cast iron borings	29.00-30.00
Cut structurals, 3 ft	53.00-54.00
Punchings & plate scrap	54.00-55.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Stove plate	42.00-43.00
Unstripped motor blocks	38.00-39.00
Clean auto cast	53.00-54.00
Drop broken machinery	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt.	51.00-52.00
R.R. malleable	60.00-61.00
Rails, 2 ft and under	65.00-66.00
Rails, 18 in. and under	66.00-67.00
Angles, splice bars	63.00-64.00
Rails, rerolling	66.00-67.00

Stainless Steel Scrap

18-8 bundles & solids	345.00-360.00
18-8 turnings	250.00-260.00
430 bundles & solids	105.00-110.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	45.00
No. 2 heavy melting	32.00
No. 1 bundles	45.00
No. 2 bundles	33.00
No. 1 busheling	45.00
Machine shop turnings	22.00
Mixed borings, turnings	22.00
Short shovel turnings	25.00
Punchings & plate scrap	54.00

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	37.00
Stove plate	37.00
Heavy breakable	35.00
Unstripped motor blocks	25.00
Clean auto cast	46.00
Malleable	42.00

BIRMINGHAM

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	*34.00-35.00*
No. 1 bundles	37.00-38.00
No. 2 bundles	27.00-28.00
No. 1 busheling	37.00-38.00
Cast iron borings	*21.00-22.00*
Short shovel turnings	27.00-28.00
Machine shop turnings	*26.00-27.00*
Electric furnace bundles	44.00-45.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	51.00-52.00
Structural & plate, 2 ft	*49.00-50.00*
Unstripped motor blocks	37.00-38.00
Charging box cast	32.00-33.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	47.00-48.00
Rails, 18-in. and under	60.00-61.00
Rails, rerolling	61.00-62.00
Rails, random lengths	57.00-58.00
Angles, splice bars	57.00-58.00

PHILADELPHIA

No. 1 heavy melting	*51.00*
No. 2 heavy melting	*43.00-44.00*
No. 1 bundles	*51.00*
No. 2 bundles	*40.00*
No. 1 busheling	*51.00*
Electric furnace bundles	52.00-53.00†
Mixed borings, turnings	36.00
Machine shop turnings	*34.00-35.00*
Short shovel turnings	38.00
Heavy turnings	46.00
Structurals & plate	54.00-56.00
Couplers, springs, wheels	*58.00-59.00*
Rail crops, 2 ft & under	64.00-65.00†

Cast Iron Grades

No. 1 cupola	49.00-50.00
Malleable	68.00
Heavy breakable cast	*53.00*
Drop broken machinery	*55.00*

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	44.00-45.00
No. 2 heavy melting	37.00-38.00
No. 1 bundles	44.00-45.00
No. 2 bundles	32.00-33.00
Machine shop turnings	26.00-27.00
Mixed borings, turnings	28.00-29.00
Short shovel turnings	30.00-31.00
Low phos. (structural & plate)	46.00-47.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Unstripped motor blocks	30.00-32.00
Heavy breakable	46.00-47.00

Stainless Steel

18-8 sheets, clips solids	320.00-325.00
18-8 borings, turnings	150.00-160.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	40.00-41.00
No. 2 heavy melting	32.00-33.00
No. 1 bundles	40.00-41.00
No. 2 bundles	30.00-31.00
No. 1 busheling	41.00
Machine shop turnings	24.00-24.50
Mixed borings, turnings	27.00-27.50
Short shovel turnings	28.00-28.50
No. 1 cast	40.50-41.00
Mixed cupola cast	38.00-39.00
No. 1 machinery cast	42.00-43.00

BUFFALO

No. 1 heavy melting	47.00-48.00
No. 2 heavy melting	38.00-39.00
No. 1 bundles	47.00-48.00
No. 2 bundles	35.00-36.00
No. 1 busheling	47.00-48.00
Mixed borings, turnings	28.00-29.00
Machine shop turnings	26.00-27.00
Short shovel turnings	29.00-30.00
Cast iron borings	28.00-29.00
Low phos.	52.00-53.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	48.00-49.00
No. 1 machinery	51.00-52.00

Railroad Scrap

Rails, random lengths	58.00-59.00
Rails, 3 ft and under	64.00-65.00
Railroad speecialties	55.00-56.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*49.00-50.00*
No. 2 heavy melting	*41.00-42.00*
No. 1 bundles	*49.00-50.00*
No. 2 bundles	*38.00-39.00*
No. 1 busheling	*49.00-50.00*
Machine shop turnings	*31.00-32.00*
Mixed borings, turnings	*31.00-32.00*
Short shovel turnings	*33.00-34.00*
Cast iron borings	*31.00-32.00*
Low phos., 18 in.	*55.00-56.00*

Cast Iron Grades

No. 1 cupola	*46.00-47.00*
Heavy breakable cast	*43.00-44.00*
Charging box cast	*43.00-44.00*
Drop broken machinery	*55.00-56.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*51.00-52.00*
Rails, 18 in. and under	*66.00-67.00*
Rails, random lengths	*59.00-60.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	40.50
No. 2 heavy melting	37.00
No. 1 bundles	40.50
No. 2 bundles	32.00
No. 1 busheling	40.50
Machine shop turnings	26.00
Short shovel turnings	28.50

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	40.00
Heavy breakable cast	39.00
Unstripped motor blocks	38.00
Brake shoes	43.00
Clean auto cast	48.00
Stove plate	*41.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*52.50*
Rails, 18 in. and under	*67.00*
Rails, random lengths	*61.00*
Rails, rerolling	65.00
Angles, splice bars	54.00

SEATTLE

No. 1 heavy melting	38.00
No. 2 heavy melting	35.00
No. 1 bundles	34.00
No. 2 bundles	26.00
No. 3 bundles	17.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	15.00-16.00
Electric furnace, bundles	52.00-55.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	40.00
Heavy breakable cast	33.00
No. 1 wheels	35.00
Unstripped motor blocks	30.00
Clean motor blocks	35.00
Stove plate (f.o.b. plant)	30.00
Brake shoes	30.00

Railroad Scrap

Rails, random lengths	38.00

LOS ANGELES

No. 1 heavy melting	42.00
No. 2 heavy melting	36.00
No. 1 bundles	39.00
No. 2 bundles	32.00
Machine shop turnings	18.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	46.00

SAN FRANCISCO

No. 1 heavy melting	36.00
No. 2 heavy melting	30.00
No. 1 bundles	35.00
No. 2 bundles	26.00
No. 1 busheling	36.00
Machine shop turning	20.00-23.00
Mixed borings, turnings	20.00-23.00
Cast iron borings	20.00-23.00
Short shovel turnings	25.00
Cut structurals	45.00
Heavy turnings	20.00-23.00
Punchings & plate scrap	44.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	35.00
Stove plate	39.00
Heavy breakable cast	36.00
Unstripped motor blocks	32.00
Brake shoes	35.00
Clean auto cast	45.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	50.00

HAMILTON, ONT.

No. 1 heavy melting	45.50
No. 2 heavy melting	41.50
No. 1 bundles	45.50
No. 2 bundles	38.00
Mixed steel scrap	38.00
Mixed borings, turnings	19.00
Rails, remelting	54.50
Busheling, new factory: Prepared	43.50
Unprepared	39.50
Short steel turnings	27.50

Cast Iron Grades†

No. 1 machinery cast	42.00-45.00

†F.o.b., shipping point.

LOGEMANN

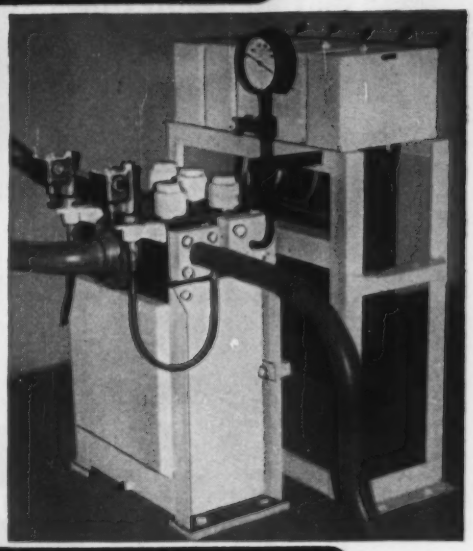
LOGEMANN Metal Balers

. . . powerful . . . compact . . . capable of high tonnage output!

In the large stamping plants and rolling mills where it is critically important that trim and stamping skeletons are quickly disposed of to avoid interference with production, LOGEMANN metal balers are relied on to keep ahead of production and pack such scrap into high density, self-cohering bricks for re-melting.

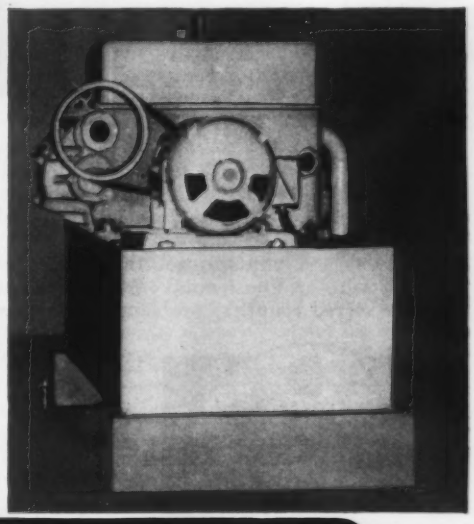
Hundreds of installations have established new records for tonnage, minimum maintenance, reliability, over extended periods of uninterrupted operation at high-speed.

LOGEMANN models are not confined to the large sizes. Many small plants have found it profitable to use smaller sizes embodying the same features of reliability, at minimum operating cost. Interested parties are invited to write for details. Information as to the character of the scrap, tonnage to be handled in a given period of hours, and range of gauges is helpful in determining the proper model.



HYDRAULIC VALVES

The illustration shows a close-coupled hydraulic valve, operated by compressed-air cylinders for high-speed distribution of large gallonage of fluid at high pressure. LOGEMANN engineers have designed and built valves for many unusual as well as standard applications, and will welcome inquiries, with an outline of the conditions and requirements.

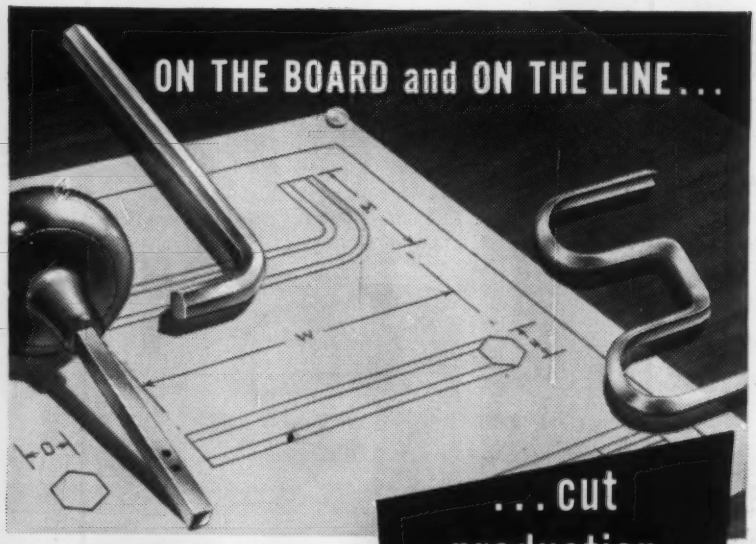


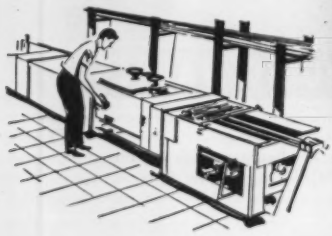
HYDRAULIC PUMPS

The opposed-cylinder close-coupled double pressure pump shown in the illustration is mounted on an individual tank to conserve floor space under present crowded plant and operating conditions. When requesting details, please indicate the nature of the service, pressure and gallonage requirements, and the fluid to be handled.

LOGEMANN BROTHERS CO.

3126 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN





...cut production costs with CONTINENTAL Special Shaped Wire

You can engineer greater savings in production when you use Continental round or special shaped wire. Usually you can reduce costs on expensive forging, stamping and rolling operations by using Continental special shaped wire. For product-trim or as a basic component, the right wire can help you cut corners—and you can get the right wire at Continental. We have solved countless problems in supplying wire for thousands of applications, in a great range of sizes and shapes, temper, finish and analysis in low or medium low carbon. Before you fill any wire need—check with Continental, wire headquarters for many firms. Write us today.

STANDARD AND SPECIAL WIRE SHAPES

flat	keystone-shaped
half-round	V-shaped
round	hexagonal
oval	grooved flat wire
half oval	special wire trim designs
square	bread-shaped
rectangular	D-shaped

CONTINENTAL

STEEL CORPORATION • KOKOMO, INDIANA

WIRE SPECIALISTS FOR OVER HALF A CENTURY

Producers of Manufacturer's Wire in many sizes, shapes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

(*Concluded from page* 201)

charters still being closed on business negotiated late last year.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3600 tons, bridges and retaining wall, Connecticut turnpike project 317-06, New Haven, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; C. W. Blakeslee & Sons Inc., New Haven, general contractor; also, 1555 tons, reinforcing bars, and 1035 tons, steel piles.

1700 tons, manufacturing building, Pitney-Bowes Inc., Stamford, Conn., to Belmont Iron Works, Eddystone, Pa.; direct to owner.

1500 tons, estimated, also plates, high speed wind tunnel, Chance Vought Aircraft Inc., Dallas, to Chicago Bridge & Iron Co., Chicago.

500 tons, county grandstand, Walla Walla, Wash., to Union Iron Works, Spokane, Wash.

470 tons, state highway bridges, Fairfax county, Virginia, to Allied Steel Products Corp., Tulsa, Okla.; Rea Construction Co., Charlotte, N. C., general contractor.

365 tons, junior high school, Springfield, Mass., to Haarman Steel Co., Holyoke, Mass.; A. E. Stephens Co., Springfield, Mass., general contractor; 70 tons, reinforcing bars, to H. Laurence Foster Co., West Springfield, Mass.

300 tons, Memorial hospital, Medford, Oreg., to Gate City Steel Co., Boise, Idaho, low at $99,200.

275 tons, lift-span bridge, York river, York, Me., to American Bridge Division, U. S. Steel Corp., Pittsburgh; Callahan Bros. Inc., Mechanic Falls, Me., general contractor.

200 tons, plant expansion, Olympia Brewing Co., Olympia, Wash., to Pacific Car & Foundry Co., Seattle.

STRUCTURAL STEEL PENDING

2564 tons, Washington state Maple street bridge, Spokane, Wash.; bids to Olympia, Wash., Apr. 17.

1500 tons, 34 tunnel diversion gates, Long Sault dam, St. Lawrence Seaway; bids Apr. 19, New York State Power Authority.

650 tons, mill addition, Armco Steel Corp., Ashland, Ky.; bids closed through United Engineers & Constructors, Philadelphia.

570 tons, three beam bridges, Bow-Concord, N. H.; also, 310 tons, reinforcing bars, and 315 tons, steel piles; bids to Concord.

500 tons, tunnel supports, etc., 2300-ft diversion tunnel, Trinity dam project; bids to Bureau of Reclamation, Weaverville, Calif., Apr. 4.

100 tons or more, steel frame addition to Iverson building, Tacoma, Wash.; Tacoma Quality Builders, low base bid at $359,000.

100 tons or more, pedestals and substation extension, City Light department; bids in at Seattle.

REINFORCING BARS . . .

REINFORCING BARS PLACED

430 tons, dormitory and other buildings, Montana University, Missoula, Mont., to Bethlehem Pacific Coast Steel Corp., Seattle; Corbin & Crain, general contractor.

305 tons, state highway bridges, Fairfax county, Virginia, to Virginia Steel Co., Richmond, Va.; Rea Construction Co., Charlotte, N. C., general contractor.

180 tons, expansion, naval base, Kodiak, Alaska, to Joseph T. Ryerson & Son Inc., Seattle; general contract to S. S. Mullen Inc., Seattle, low at $3,477,306.

175 tons, laterals and wasteway, Columbia Basin project, to Bethlehem Pacific Coast Steel Corp., Seattle.

REINFORCING BARS PENDING

2300 tons, Priest Rapids, Columbia river, power project; Merritt, Chapman & Scott, New York, low at $91,878,625 to Grant County P.U.D. No. 2.

830 tons, Washington state bridge, Spokane, Wash.; bids to Olympia Apr. 17.

400 tons, four guided missile structures, Fairchild Air Base, Spokane, Wash.; Campbell Construction & Equipment Co., San Francisco, low at $3,644,408 to U. S. Engineer, Walla Walla, Wash.

100 tons or more, 12 to 14-in. precast con-

GIANT PUBLIC AUCTION SALE $8,500,000 VALUATION!

FORGING MACHINE SHOP; HAMMER SHOP; HEATING & ANNEALING; TOOL ROOM; VALUABLE INDUSTRIAL REAL ESTATE

By Order of CAMDEN FORGE COMPANY, MT. EPHRAIM AVE., CAMDEN, N. J.

Sale Begins: TUES., APR. 10, '56 at 10 A.M. Inspection Apr. 2 to Sale Date.

HYDRAULIC FORGING PRESSES: 2—1200 Ton, United; 350 Ton, Falk; all with accumulators and pumps.

MANIPULATORS: 6000# & (2) 2000# Brosius, Motor and Gas Engine driven.

STEAM HAMMERS: 8000#, 6000#, 5000#, 3000#, 800#, Chambersburg; 1500# R. Steel & Sons; 350# Nazel.

HEATING & ANNEALING FURNACES: Ingot Heating, 4'x11', 6'x10', 10'x16'; Billet Heating, 3'x5', 4'x8', 5'x7', 5'x10'; Tool Heating, 3'x3', 42" dia.; H.S. Tool Forging, Tool Treating & Salt Bath; Car Hearth Annealing, 4'x33"x8', 7'x66"-x36', 7'x33"x18', 7'x33"x36', 7'x33"x66', 5'x-48"x15', 7'x60"x72', 24"x26"x12'; Rotor Treatment, 40"x9'; Beam Furnaces, 10'x6', 6'x18" dbl. chambered; Ring Heating Furnaces; VERTICAL, 6' dia. x 16' deep, 8' dia. x 16" deep, all attachments, with QUENCHING TANKS, Industrial Power Engrg. Installed NEW 1952.

BORING MILLS: Vertical 84" Niles, 54" & 24" Bullard; horizontal 6½" Espen-Lucas, 5" Bar Floor Type, Ohio.

SHAPERS: 36" stroke American, 24" stroke G&E and 20" stroke G&E; 7" Bench Ammco.

MILLERS: #3 & #4 Cincinnati, 32"x32"x14' Ingersoll.

PLANER: 60"x60"x20' Sellers.

SLOTTERS: 60" & 48" Niles, 54" stroke Newton.

GRINDERS: 24"x168" Cincinnati, 20"x10' Landis, Diamond, Norton, Sellers, Pratt & Whitney, Oliver, Hammond G&L, Brown & Sharp.

KELLER MACHINES: BG-1, 5'x10', 3½'x6', 3'x5', Pratt & Whitney.

LATHES: 32"x204" LeBlond, NEW 1954; 52"x52'4" and Size 109". Niles: 18"x15'6" Stillwell-Bierce; 40"x55', 40"x20', 38"x25', 30"x28', 30¾"x50', 30¾"x17', 30¾"x10', 28"x31', 16"x30', 12"x7'6" Bridgeford; Monarch, Lodge & Shipley, American, Reed-Prentiss, Sellers.

DRILLS: Horizontal 4" Dietrich & Harvey, Fairbanks, Newton, Walker-Turner, Foote-Burt, Excelsior.

SAWS: Circular 17"x17", 12"x12" Newton; 18"x18" & 10"x10" Armstrong-Blum; 9"x9" Hacksaw Peerless; Racine, Dewalt, Thor, Clipper.

LOCOMOTIVE CRANES: 35 Ton Steam 50' Boom Orton.

TRAVELING CRANES: 160 Ton, 50 Ton, 25 Ton, 15 Ton—71'10" Span; 15 Ton—48'9" Span; 10 Ton—38'9" Span; 35 Ton Gantry Morgan; Niles, Pratt & Whitney.

POWER PLANT: 1500 H.P. High Press. Boilers; 840 K.W. Diesel Electric Generator Sets; 300 K.W. Steam Engine Generator Sets.

COMPLETE STEEL ANALYSIS and TESTING LABORATORY.

SWITCHING LOCOMOTIVES: 4 Ton & 18 Ton Gasoline F.R.H., with (10) 50 Ton Flat Cars.

BIG TONNAGE: INGOTS, BILLETS, SCRAP METALS, STEEL CABLE, COPPER CABLE, RAIL.

MISCELLANEOUS: Blowers, Fans, Heaters, Railroad Beam Dies, Coal Pulverizers, Air Compressors, Pipe & Bolt Threaders, Storage Tanks, Recording Instruments, Electric Magnet, Lincoln Welders, Metal Spray Unit, Acetylene Generators, Car Puller, Metal Lockers, Office Furniture, Hoists, Motors, Tensile Test Machines, Tools, Dies, Fixtures.

INDUSTRIAL REAL ESTATE: 20 Acres Land, 220,000 to 300,000 Sq. Ft. Manufacturing Space, 3 Acres Parking Area, R. R. Siding.

FREE — Illustrated Circular Sent on Request—FREE

BERNARD MAGRILL, Auctioneer
c/o Camden Forge Co., Mt. Ephraim Ave., Camden, N. J.
TEL. WOODLAWN 3-2800

crete pipe, also laterals, etc.; Columbia Basin projects; bids to Bureau of Reclamation, Ephrata, Wash., Apr. 5.

100 tons, Washington state highway projects; bids to Olympia, Wash., Apr. 3.

PLATES . . .

PLATES PLACED

9000 tons, steel piling, Rocky Reach power project, Columbia river, to Columbia Steel Co., and Bethlehem Pacific Coast Steel Corp., Seattle, on 50-50 basis, by Chelan County P.U.D., Wenatchee, Wash.

100 tons or more, storage tank, to Chicago Bridge & Iron Co., Seattle, and fueling facilities to Harold Kaeser Co., Seattle, for Paine Air Base, Everett, Wash., by U. S. Engineer.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Pennsylvania, 79 diesel electric locomotives placed; fifty-five 1750-hp units to Electro-Motive Division, General Motors Corp., La Grange, Ill.; fifteen units, comprising nine 1800-hp and six 2400-hp engines to Alco Products Inc., New York; nine 2400-hp units to Fairbanks, Morse & Co., Chicago. These units make for a total of 2134 diesels owned by the Pennsylvania. Their total horsepower is 2,997,820.

Seaboard Airline, twenty-five 1750-hp diesel electric road switching units to Electro-Motive Division, General Motors Corp., La Grange, Ill.

RAILROAD CARS PLACED

Chicago, Rock Island & Pacific, 300 hopper cars and 200 gondolas, to Pullman-Standard Car Mfg. Co., Chicago.

Florida East Coast, 100 Gondolas to Magor Car Corp., New York, and 35 covered hopper cars to Pullman-Standard Car Mfg. Co., Chicago; purchase authorized by court.

Norfolk & Western, 50 seventy-ton covered hopper cars to Pullman-Standard Car Mfg. Co., Chicago.

MAJOR WIRE PRODUCTS MANUFACTURER
Looking For
EXCLUSIVE REPRESENTATIVES

For soliciting contract wire work (fan guards, oven and refrigerator shelves, baskets, etc., etc.), in New England, West Pennsylvania, Ohio, West Virginia, Mid-Western and Southern States.
Reply Box 389, STEEL
60 East 42nd St. New York 17, N. Y.

CLASSIFIED

Help Wanted

MELTING METALLURGIST — Tool Steels — Stainless Steels — Superalloys. Staff level for manufacturing control, research and development on melting practice—induction and arc furnaces; specific experience in these alloys required. Some consultation with customers. New operation in old established company. Salary open. Location—Industrial Great Lakes. Reply Box 393, STEEL, Penton Bldg., Cleveland 13, Ohio.

DEVELOPMENT ENGINEER

Well established producer and fabricator of welded steel tubing requires aggressive engineer with mechanical and electrical background and experience. Will be in complete charge of Production Development, Tools, Dies and Equipment and General Plant Engineering. Good salary and other benefits. Replies confidential to Box 375, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

Sales—Either mill or warehouse for Cleveland and adjacent territory. Experienced—carbon and alloy, hot and cold rolled, also heavy forged bars. Would consider inside sales for local sales office. Reply Box 396, STEEL, Penton Bldg., Cleveland 13, Ohio.

FOR CLASSIFIED RATES

And Further information write
STEEL, Penton Bldg., Cleveland 13, O.

WANTED

ELECTRIC STEEL MELTING FURNACE

TILTING TYPE, 12' DIAMETER SHELL, TOP CHARGE, SWINGING ROOF TYPE, WITH OR WITHOUT TRANSFORMER AND ELECTRIC CONTROLS. MUST BE IN GOOD CONDITION.

Contact:

Mr. J. A. Bright, Chief Engineer
Pittsburgh Metallurgical Company, Inc.
3801 Highland Avenue
Niagara Falls, New York

CLEANING ROOM FOREMAN

Most modern and progressive steel foundry in the middle west. Advise full particulars.

Swedish Crucible Steel Co.
8561 Butler Avenue
Detroit 11, Michigan

SALES MANAGER

Familiar with stainless steel and high temperature alloys. Technical background preferred. Location western Michigan.

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Grand Rapids, Michigan

SALESMAN

Well established firm desires man experienced in selling lubricants to steel rolling mills. In reply state experience, salary desired and recent photo.

Box 395, STEEL
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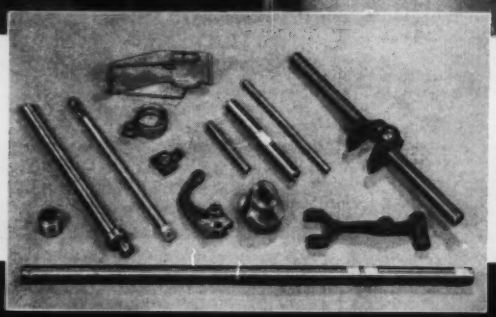

Typical parts heat treated in Hevi Duty furnaces at the Union Special Machine Co.

UNION SPECIAL
***heat treats* precision parts in**
HEVI DUTY FURNACES

● Over 100 different heat treating operations are represented in one Union Special industrial sewing machine. All the carburizing, dry cyaniding and bright annealing of precision ground shafts, bearings, journals, castings and eccentrics is done in versatile Hevi Duty Vertical Retort Furnaces.

Walter Weinwurm, chief metallurgist at Union Special, says "Our Hevi Duty furnaces do an exceptionally good job of heat treating precision parts. The work comes out of the furnaces clean with no scale or oxidation."

Learn more about Hevi Duty vertical retort furnaces — write for your copy of bulletin HD-646 today.

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Heat Treating Furnaces... Electric Exclusively
Dry Type Transformers ***Constant Current Regulators***

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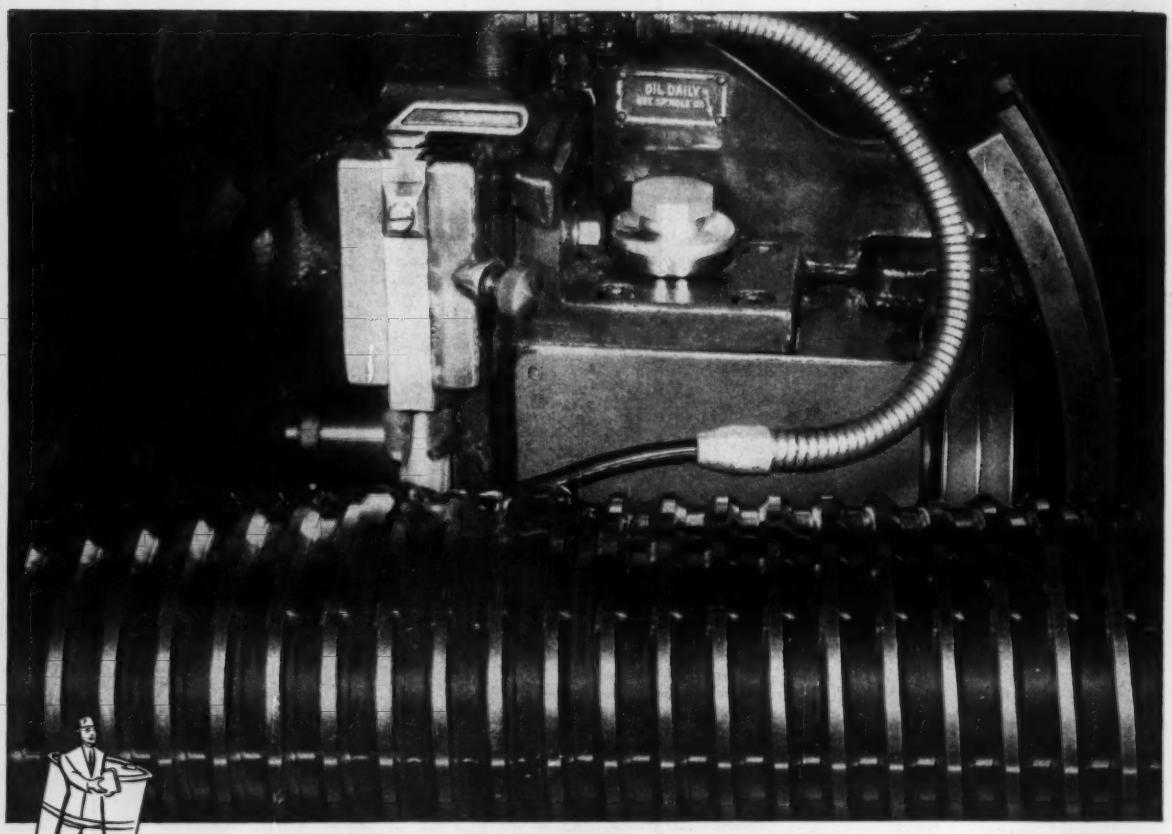

Ask "the Man in the Barrel" to tell you how . . .

A Grinding Oil can *make* or *break* precision grinding jobs!

If you're using *just a coolant* or any oil that happens to be handy for those precision grinding jobs . . . it's costing you money!

A grinding oil can make or break a precision grinding job such as thread grinding, gear grinding and many types of form grinding. Grinding oils are usually classified as "hard-acting" or "soft-acting" depending on how they affect grinding wheel hardness. Grinding oil characteristics must be closely coordinated with wheel characteristics, speeds, feeds, and material machinability and hardness to obtain maximum performance.

When form grinding low hardness materials, where wheel form is important, a "hard-acting" oil helps to maintain proper wheel form by making the wheel act harder. As a result, greater wheel life is obtained and more accurate parts are produced.

When a high hardness material is being ground there is a tendency for the wheel to load-up and glaze. Such a condition is the cause of burnt work surfaces and heat checks, and is often encountered when grinding taps, gauges and other hardened parts. A "soft-acting" grinding oil will make the wheel act softer, opening up the wheel and exposing new abrasive grains to do the work.

Stuart's complete line of grinding oils have been chemically balanced and scientifically tested to meet the demands of various types of precision grinding operations. "The Man in the Barrel," your trained Stuart Representative, will be happy to assist you in selecting the proper grinding oil for your particular needs. Ask to have him call . . . and ask for a Stuart's Precision Grinding Oil Bulletin, too.

D. A. STUART OIL COMPANY, LTD.
2735-37 S. Troy Street, Chicago 23, Illinois

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Time Tested Cutting Fluids and Lubricants

Plants in: Chicago, Detroit, Cleveland, Hartford, Philadelphia and Toronto, Ontario.

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ALTERNATING CURRENT MOTOR

SERIAL	✓	STYLE	✓
TYPE	✓ FRAME ✓	H.P.	✓
VOLTS	✓	CYCLES	✓
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THE MASTER ELECTRIC CO., DAYTON, O., U.S.A.
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What are your power drive requirements? Here at Master, with the widest selection in the nation to choose from, you're sure to fill your needs quickest and best.

Need something special in gear reduction—electric brakes—variable speed operation—fluid drive or special mounting? Or would some of our standard models (⅛ to 400 H.P.) fill the bill? You'll find the answer here! And remember, all Master components are engineered to form combinations of units in one streamlined, compact package of efficiency. Name your need and the name that fills it is Master—for greater salability of motor driven products; for increased productivity of plant equipment.

Motor Ratings..⅛ to 400 H.P. All phases, voltages and frequencies.

Motor Types.....Squirrel cage, slip ring, synchronous, repulsion-start induction, capacitor, direct current.

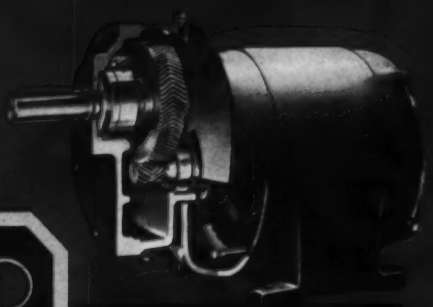
Construction ....Open, enclosed, splash-proof, fan-cooled, explosion-proof, special purpose.

Speeds .....Single speed, multi-speed, and variable speed.

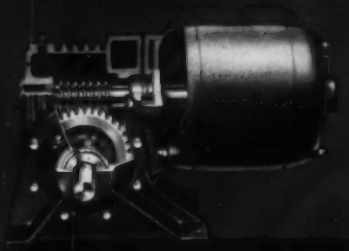
Installation .....Horizontal or vertical, with or without flanges and other features.

Power Drive Features .....Electric brakes (2 types)— 5 types of gear reduction up to 432 to 1 ratio. Mechanically and electronically-controlled variable speed units—fluid drives—every type of mounting.

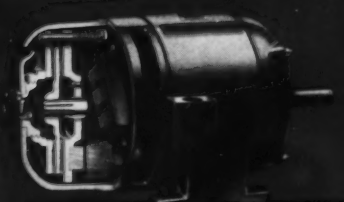
THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO



Parallel Shaft Gearmotors

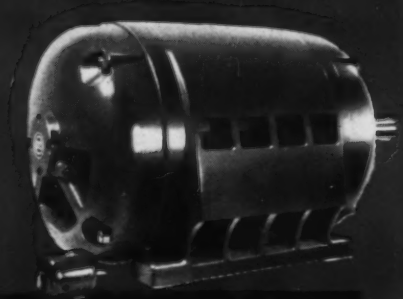


Right-Angle Shaft Gearmotors



Unibrake Motors

Speedrangers



Standard Motors— ⅛ to 400 H.P.

TIMKEN® bearings eliminate chatter on fast cutoff machines

TAYLOR-WILSON cutoff machines are designed for high-speed crop ending of pipe up to 26" O.D. This calls for carboloy tools and high speeds.

Previous machines could not be run at the desired high speeds because of tool chatter. That meant losing the production advantages of carboloy tools.

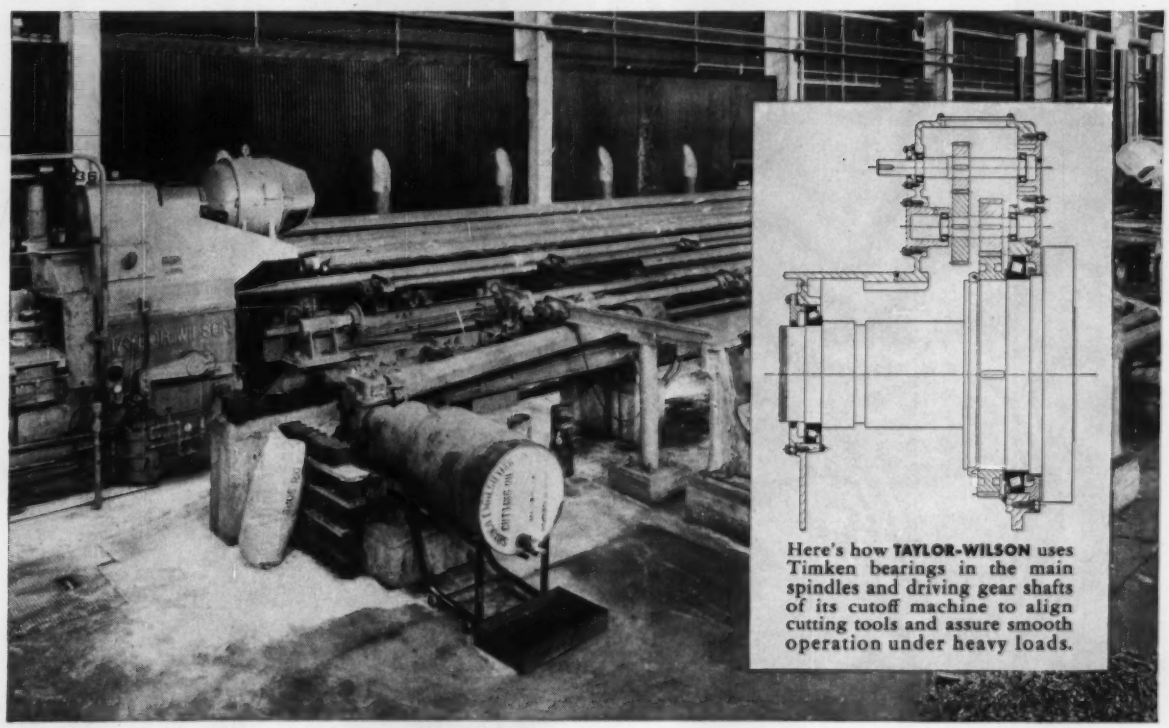
Taylor-Wilson engineers solved the problem by switching to Timken® tapered roller bearings in the main spindles and drive gear shafts. In spite of high pressures on the tools, Timken bearings keep the shafts in perfect alignment, assuring smoother operation. Result: machines operate at maximum r.p.m. and, most important, there's no chatter. Bearings last longer and adjacent parts require a minimum of maintenance.

Because Timken bearings are tapered, they take radial and thrust loads in any combination. No thrust bearings are needed. And full line contact between rollers and races gives them extra load-carrying capacity. Valuable space is saved because Timken bearings are so compact they permit highest load-carrying capacity in smallest space.

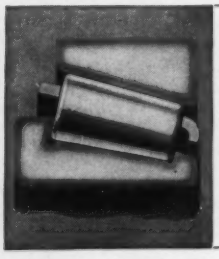
Wear is held to a minimum because Timken bearings practically eliminate friction. They're designed to have true rolling motion. And they're made microscopically accurate to conform to their design. To insure their quality every step of the way, we make our own fine alloy steel. We're the only bearing maker in America that does.

You can have all these advantages in the equipment you build or buy if you specify Timken bearings. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



Here's how **TAYLOR-WILSON** uses Timken bearings in the main spindles and driving gear shafts of its cutoff machine to align cutting tools and assure smooth operation under heavy loads.



GREATER LOAD AREA

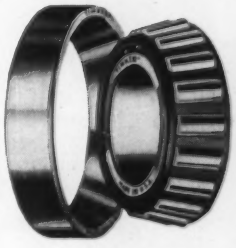
Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST ▯ LOADS OR ANY COMBINATION